January 4, 1930 | *A McGraw-Hill Publication* | 25 Cents per Copy

AVIATION

The Oldest American Aeronautical Magazine

Inspiring Confidence IN THE AIR PASSENGER

PRODUCING *Wood Parts* FOR AIRCRAFT

A TECHNICAL DESCRIPTION OF THE *Dornier Do.X*

R. Sidney Bowen, Jr.
Associate Editor

Leslie E. Neville
Technical Editor

Deane Davenport

David J. Leigh

Charles F. McReynolds
Pacific Coast Editor

AVIATION

The Oldest American Aeronautical Magazine

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Detroit Editor

Contents for January 4, 1930

Volume 28, Number 1

COMING EVENTS

An interview with Leroy Manning, pilot of the Ford plane that toured Europe this summer, on his observations there. ¶Mr. Petliakov, assistant engineer on the construction of the Russian plane that lately visited America, tells of aeronautical research and airplane design in Russia in an article to be published in an early issue. ¶Coming descriptions—Consolidated Commodore—the new Junkers giant.

McGRAW-HILL PUBLISHING COMPANY, INC., Tenth Ave. at 36th St., New York, N. Y.

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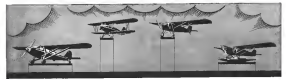
IT SEEMS appropriate at this time to define the present position of the Curtiss-Wright Sales Corporation and to outline its plans for the future. The Corporation is now the sole outlet for the entire commercial aircraft production of these outstanding manufacturers in the Curtiss-Wright group. *Travel Air Company*, makers of one out of every four commercial planes in the United States, builders of 17 types of planes and of the spectacular Mystery ship which outflew every competitive speed plane at the Cleveland Show. *Curtiss-Robertson Airplane Manufacturing Company*, with its Curtiss-Robin three place cabin monoplane, probably the most widely known moderate priced plane for all-round use. *Curtiss Aeroplane and Motor Company*, pioneer builders of airplanes and engines, whose Fledgeling training plane was chosen in open competition by the Navy and is now widely used by commercial flying schools, whose giant twin-motored Condor is the latest luxury in transcontinental

CURTISS
SALES

transport ships. ⁓ *Moth Aircraft Corporation,* whose DH Moth biplane has a brilliant record of over 10,000,000 miles in the air. Easily housed in a one-car garage, the Moth is destined to be the most popular light plane. ⁓ *Loening Aeronautical Engineering Corporation,* the world's leading producer of amphibian planes, creators of special types for military, naval and coast guard use, makers of the Air Yacht for transport service and of the Commuter, the luxurious craft now favored by wealthy sportsmen pilots. ⁓ *Keystone Aircraft Corporation,* long noted as producers of large multi-motored aircraft, builders of famous



TRAVEL AIR COMPANY
■
■
■
WICHITA KANSAS

To build the best Airplanes in their class, regardless of cost, will continue to be the policy of the Travel Air Company. This policy, the wisdom of which has been thoroughly proven, has brought the company from a modest beginning to a position of leadership in the aircraft industry in six short years Our plant and organization at Wichita, now ready for production on an increased scale, will continue to serve owners and operators. With a distributor personnel fortified by able additions and with the country wide facilities of Curtiss Wright service stations and dealers now made available to us, Travel Air's position will be further strengthened.

Walter H Beech
PRESIDENT

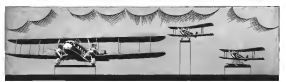
CURTISS-ROBERTSON AIRPLANE MANUFACTURING COMPANY
■
ST. LOUIS MISSOURI

The Curtiss Robin was widely accepted within a short time because it gives the purchaser more airplane per dollar than any plane in its class The winning of the world's endurance record and its numerous other achievements proved the basic soundness of the type Now, with the same fine up-to-date plant that made the large scale production of the Robin possible, we confidently look for even greater results in 1930. And by having our planes and parts distributed and serviced by the Curtiss Wright group, every ship will carry with it a service guarantee not approached by any competitive line.

Wm B Robertson
PRESIDENT

WRIGHT
CORP.

army bombers and of the Patrician, tri-motored 18-passenger transport. ⁓ These Companies, each pre-eminent in its field, will retain their own identities as manufacturing units, will continue under the same able leadership which has brought them to the forefront in the industry. Through the unifying control of the Curtiss-Wright Corporation, their position will be strengthened by the coordination of development work, the centralizing of raw material purchases, the pooling of technical information and research data, the elimination of duplication and waste. ⁓ Backing their program of development is the largest



CURTISS AEROPLANE AND MOTOR COMPANY
■
■
GARDEN CITY NEW YORK

I am glad that the products of the Curtiss Aeroplane and Motor Company are now to be carried into the field of commercial aviation by the Curtiss-Wright Sales Corporation. We hope to serve the public through this new organization as faithfully as we have served the Army and Navy, where for twenty years Curtiss planes and motors have always done their bit

VICE-PRESIDENT

MOTH AIRCRAFT CORPORATION
■
■
■
LOWELL MASS

The Moth Aircraft Corporation has become the light plane division of Curtiss Wright. We will carry on with all distributors and dealers who have handled our products in the past To these dealers and their customers, will be available over one hundred Curtiss-Wright service stations throughout the country, in addition to existing Moth stations in the United States, Canada and foreign countries

There will be no change in policy, but all contracts for sales will be made through the Curtiss-Wright Sales Corporation, who will represent us throughout the world. I believe that this set-up offers to dealers, as well as Moth owners, a service and an economy which cannot be approached by any other light airplane producer in the United States

PRESIDENT

CURTISS SALES

aviation enterprise in the world with a capital amounting to one-third the total aviation investment of the country. Backing their products is a nation-wide service organization including *Curtiss-Wright Flying Service, Inc.*, which operates 40 flying schools capable of training 10,000 pilots a year. With an array of aircraft covering the entire range of type, style and price, the distributing organization of Curtiss-Wright Sales Corporation faces a world ready and anxious to fly. Aviation activities are now more than doubling every year. Airports, airlines, flying schools, aviation country clubs, are being organized

WRIGHT CORP.

on all sides. Private planes, licensed pilots, air-traveling passengers are rapidly increasing in numbers from month to month. The time for organized sales and service has arrived. Curtiss-Wright Sales Corporation invites all interested in the new era of aviation to meet the executives of the Corporation at the St. Louis Aviation Show, February 15th to 23rd, to inspect its complete line of aircraft exhibited there and to discuss mutually profitable plans for the future. Complete details regarding the entire line of Curtiss-Wright Airplanes will be gladly supplied from the offices of this Corporation.

WALTER H. BEECH, PRESIDENT

CURTISS-WRIGHT SALES CORPORATION

27 WEST 57TH STREET · NEW YORK

LOENING AERONAUTICAL ENGINEERING CORPORATION
■
■
NEW YORK CITY

Keystone Loening Amphibians, originally developed from the military Loening planes, have taken their place as machines of greatest reliability for both private and transport use, as evidenced by their universal acceptance during 1929 To meet the growing demand for these planes, they will hereafter be built at the Bristol factory of the Keystone Aircraft Corporation, where augmented facilities will permit large production on an economical scale. The distribution and servicing of Keystone-Loening Amphibians by the extensive Curtiss-Wright organization will increase their practical utility to transport operators and private owners.

VICE PRESIDENT

KEYSTONE AIRCRAFT CORPORATION
■
■
■
BRISTOL PENN

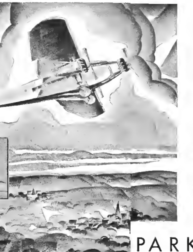
With an established reputation as leading producers of military aircraft and multi-motored transports, Keystone's large facilities have now been practically doubled to permit the production of commercial planes With a highly efficient organization, we are now producing various types, including the well known Keystone-Loening Amphibians, training planes, and a series of Patrician air liners in quantities that will result in manufacturing economies. Distribution will be handled through the nation-wide sales and service organizations of the Curtiss Wright Corporation, with obvious advantages to users of our products

PRESIDENT

AVIATION January 4, 1930 9

America's Finest Flying Course has been made *even better!*

This Parks P-a biplane is completely equipped for night flying with dual instrument board, landing lights and parachute flares. It is used nightly in the instruction of Transport Pilot students of Parks Air College



Group of Parks students inspecting the new tri motored Ford. Each of these men will be given a thorough course of instruction, including five hours in absolute charge of this monster plane.

Parks student fueling new Ryan Brougham—a sister ship to Lindbergh's "Spirit of St. Louis"—which has recently been added to Parks equipment for student instruction.

GIANT tri-motored Ford monoplane, Wosp-powered, oddedtoPorks equipment.

Parks Air College has taken another tremendous step forward.

To its mighty fleet of more than thirty training planes America's largest civilian flying school has now added a *giant, all-metal Ford monoplane,* powered by three 425-horsepower Wasp engines—an exact duplicate of the air leviathans in operation on the largest American passenger lines.

Every Parks transport student will receive thorough instruction in the handling of the new Ford—eight hours at its controls, including five hours *in absolute charge* of the huge plane.

The addition of this great new ship is one more reason why you should take your training at Parks. *No other aviation school has been so progressive* in furnishing its students with the very finest equipment money can buy.

The Parks training fleet of planes, for both day and night training, includes open cockpit ships of several types and of varying power, cabin planes of latest design, and big transport planes. In addition to the new Ford monoplane, we have just bought a six-passenger Ryan brougham, powered with a 300 h. p. Wright Whirlwind motor.

Every Parks flying school instructor holds a U. S. Government license, and is a man of high skill and thorough experience. They are all expert in their various fields. Some of them specialize in flying, others are ground school instructors doing nothing but classroom and lecture work, still others are practical shop men—and so on.

Mr. Parks personally supervises *every activity at the school!* He insists upon *thoroughness every step of the way.* He feels a personal responsibility for the training of every student.

No wonder that Parks Air College was one of the very first schools to be fully approved by the U. S. Dept. of Commerce! Small wonder that Parks graduates are grabbed up quickly by aviation executives to fill important jobs at big salaries!

Interior view of our new Ford monoplane.

You can't afford any training but the best. And you can get the best training *only at Parks.* Your future is in the balance. Don't gamble with it. There's a big job for you in aviation. Let Parks fit you for it. Take the first step *today.* Send the coupon for catalog.

IMPORTANT ANNOUNCEMENT—All Parks Air College courses will be advanced in price effective midnight, January 25, 1930. There is still time to enroll at present low prices. Send coupon—or wire—for information.

PARKS AIR COLLEGE

(Division of Detroit Aircraft Corporation)
151 Missouri Theatre Building

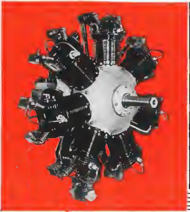
ST. LOUIS MISSOURI

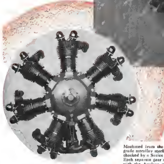
. . . COUPON . . .

PARKS AIR COLLEGE
151 Missouri Theatre Building, St. Louis, Missouri

Without cost or obligation to me, please mail your illustrated catalog

Name ____________________
Street address ____________________
City ____________ State ____________





ANNOUNCEMENT

Announcement is made of the consolidation of the Hamilton Aero Manufacturing Company of Milwaukee and the Standard Steel Propeller Corporation of Pittsburgh. The name of the new company, which is a subsidiary of the United Aircraft & Transport Corporation, is the Hamilton Standard Propeller Corporation. Mr. Thomas F. Hamilton is Chairman of the Board of the new company, Mr. Harry A. Kraeling is President and Eugene E. Wilson, formerly Commander U. S. N., Vice President.

* * *

AN immediate development resulting from this consolidation is the enlargement of the engineering and research departments of the amalgamated companies. In addition to the new plant and other modern facilities at Pittsburgh full use will be made of available speed courses and testing facilities at Milwaukee and Los Angeles to improve the performance of existing designs and develop new types. The Hamilton Standard engineering staff offers complete cooperation with manufacturers in the study and solution of their specific problems

The consolidated organization also makes possible more complete and rapid service. A modern factory branch and service station has been established at Los Angeles where ample propeller stocks are carried for prompt delivery. Complete heat treating and straightening equipment is being installed to facilitate repair work which will be carried on under expert supervision. Additional branches will be established at strategic points.

For the present, prices will continue in accordance with the price list issued by the Standard Steel Propeller Corporation in January, 1929. Work is now being carried forward on the practical problem of allocating production between various factories. Should manufacturing economies be effected, it will be the policy of this company to reflect such economies by price reduction to the industry.

HAMILTON STANDARD PROPELLER CORPORATION
Division of the
UNITED AIRCRAFT AND TRANSPORT CORPORATION
PITTSBURGH · · MILWAUKEE · · LOS ANGELES

AT EASE IN THE AIR

—and on the ground

Theory says that increased complexity of design is justified by higher efficiency

Practice says that simplicity of design may give more service than would a slight increase in theoretical efficiency.

OF TWO engines giving equal service in the air, that one is better which can be cared for with least expense and trouble on the ground.

Busy men and women who fly appreciate the Comet aircraft engine because its strength and simplified design give hundreds of flying hours without expert attention.

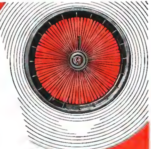
Any man or woman who can use a grease gun and wrench can use a Comet for an entire season without hired help.

Relatively low cylinder pressure and low r. p. m. result in a freedom from strain that increases the life of all wearing parts. Operating without internal strain, Comet gives the train-like regularity of service that is demanded of the family automobile.

COMET ENGINE CORPORATION

MADISON, WISCONSIN, U. S. A.

Comet aircraft engines are manufactured at Madison, Wisconsin, under the direction of the Gisholt Machine Company, for 40 years builders of fine machine tools in use throughout the world . . . 7 cylinders, 150 horsepower (manufacturer's guaranteed rating)



Leadership

Kelsey-Hayes aircraft landing wheels were the first to be produced in quantities for this industry.

Today the majority of wheels used for aircraft are the Kelsey-Hayes product.

In developing new designs and refined construction Kelsey-Hayes Wheels have kept pace with the exacting aeronautical requirements.

Manufacturers have a wide variety of sizes from which to choose, ranging from the 14 x 3 tail wheels to the 36 x 8 side wheels.

Kelsey-Hayes aircraft engineers will be glad to supply you with data as it applies to designs which you are now developing.

Aircraft Division
KELSEY-HAYES WHEEL CORP.
DETROIT, MICH.
Affiliated Divisions
Wire Wheel Corp. of America Buffalo N. Y.
Kelsey Wheel Company Memphis Tenn.
Kelsey Wheel Company Ltd. Windsor Ont.

KELSEY-HAYES

AIRCRAFT LANDING WHEELS

All Aviation is invited to use the Curtiss-Wright Airports

Bettis Airport in Pittsburgh is the gateway between East and West Air Traffic

A nation-wide chain to provide facilities for the entire industry

THIS first nation-wide system of major airports in the United States is unified under Curtiss-Wright Airports Corporation ownership and management.

Each port is strategically located to business centers—and on the main highways of both present and future air travel.

Preferred space is for lease today on exceptional terms to transport companies, aerial photographers, railroads who will engage in air transportation, manufacturers of planes, of engines, supplies, accessories, fuel companies, and to all commercial operators and private plane owners. Only student instruction and local passenger carrying are reserved exclusively for the Curtiss Wright Flying Service.

Among the leading aviation interests who have *already* leased space on Curtiss Wright ports are: American Eagle Co., American Moth Distributors, Clifford Ball Airlines, Continental Air Express, Hodgkinson Aircraft Co., Irving Air Chute Co., Inc., Kinner Airplane Motor Co., Maddux Air Lines, Nevada Air Lines, Pennsylvania Air Lines, Pickwick Airways, Inc., Rio Grande Oil Co., Transcontinental Air Transport, Inc., Union Oil Company, Vortex Wing Corporation.

We will be glad to send detailed information about our present airport developments and future plans to executives.

Kindly write to Department P-7, Curtiss Wright Airports Corporation, 27 West 57th Street, New York City

Above — a typical Sunday aviation crowd at the Curtiss Chicago airport

Left — these new modern hangars offer every facility for plane operation, accommodation, servicing and repairs. A noteworthy feature is the elevated promenade that allows aviation enthusiasts a comfortable, full view of all flying and field activities

CURTISS-WRIGHT AIRPORTS

In New York Area: Valley Stream, L. I. · Caldwell, N. J. · North Beach, N. Y. C. · Hadley Field, N. J. · · Los Angeles, Cal.
In San Francisco Area: Alameda, San Mateo · · Houston, Texas · Milwaukee, Wis. · Chicago, Ill. · St. Louis, Mo.
Cleveland, Ohio · Pittsburgh, Pa. · Baltimore, Md.

The Monocoupe and

Berryloid

AIRCRAFT FINISHES

Mono Aircraft Corporation's first ship was finished 100 per cent with Berryloid as are the planes now coming off the production line. The Red-winged Blackbird inspired the combination on the above Monocoupe —International orange, Boeing yellow and black.

MEMBER · AERONAUTICAL · CHAMBER · OF · COMMERCE

Not a complaint *in* three years

MONO AIRCRAFT CORPORATION
MOLINE ILLINOIS
U.S.A

August 22, 1929.

Mr. Tom Colby,
Berry Brothers, Inc.,
211 Leib St.,
Detroit, Mich.

Dear Tom:

Three years ago this month the first Monocoupe was ready for covering and finishing. We were anxious to use the most modern finish obtainable and made inquiry of Berry Brothers. You will recall that you, personally, doped and sprayed our first airplane.

Since that time we have built about five hundred airplanes in our various models and with the exception of possibly a dozen, all of these planes had Berry Brothers dope and lacquers.

We have yet to receive our first complaint on the exterior finish of these planes.

Celebrating our third anniversary, this thought has come to us and we are merely recalling the incident of your first effort and our complete satisfaction.

Yours very truly,

MONO AIRCRAFT CORP.

Don. A. Luscombe, Pres.

DAL:GM

MONO AIRCRAFT was preceded in this series by STINSON FOKKER BUHL TRAVEL AIR EAGLEROCK KEYSTONE BOEING COMMAND AIRE and FAIRCHILD

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Winnipeg, Canada

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Varnishes Enamels Lacquers
Detroit Michigan
Walkerville Ont.

PERFECT SEALING—HIGHER *CEILINGS*

Valves that stand up longer than the average — without burning, warping or excessive wear — contribute importantly to an engine's reputation for reliability. Perfect valve sealing maintains maximum engine power—affords maximum speed and lift for planes.

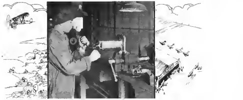
Thompson Valves are designed, both metallurgically and structurally, to withstand the extreme stresses of air service. They are used today in 95 per cent of all American-built airplane motors.

THOMPSON PRODUCTS, INCORPORATED
***General Offices*, Cleveland, Ohio, U. S. A.**
***Factories:* Cleveland and Detroit**

TP

Thompson Valves

Original Equipment in 95% of American-Built Aero Motors



A great vise for the airport

Repairs on motor parts require careful workmanship and proper tools.

With the NuTYP the part is held securely and at the best angle for good work. In the best equipped airport shop in the east, the Empire Airways repair shop, the NuTYP is proving daily its versatility.

The NuTYP vise has been truthfully called the only all around vise in America, for it gives an unlimited number of holding angles.

The real feature of the NuTYP vise is the two sets of jaws which can be used simultaneously — the machinist vise with renewable steel jaws and the pipe vise which gives a strong grip without crushing the part held—the captive wrench on the side is a patented feature.

The NuTYP vise is made in three sizes, $3\frac{1}{2}''$, $4\frac{1}{2}''$ and $5''$ jaws. All parts are made of first grade metal and carefully inspected.

Your interest in this vise will receive our immediate attention. Write to address below.

NuTYP (new-type) **VISE**

The Empire Airport shop is one of the best equipped shops in the East

The views above are shown with permission of Empire Airways Inc., Syracuse N. Y.

OSWEGO TOOL COMPANY

OSWEGO, NEW YORK

The "Performing Pair" . . . John Livingston and his winning WACO. Send for his own story of the Tour and also the WACO "225" booklet that describes the ship he flew to victory . . . both interesting and mailed to you free of charge.

The stop-watches *click*..and WACO *sets new records*

$4\frac{4}{10}$ seconds to take off.... $3\frac{1}{10}$ seconds to dead stop!

IT'S the day before the start of The Fifth National Air Tour from Detroit. Ships of all types line the paved runway at Ford Airport, ready for their "unstick" tests . . . or circle aloft, awaiting the signal to land for their "stick" tests.

Down in front of the judges' stand, John Livingston is ready to take off in his WACO. He guns the motor . . . releases the brakes. The wheels move . . . three stop-watches click. And the official timers clock his take-off at the remarkable figure of 4-4/10 seconds . . . from the instant his WACO starts to move until it lifts from the ground!

But his landing time is still more astounding. The same three stop-watches show *exactly 3-4/10 seconds* . . . from the time the wheels first touch the runway until they come to a dead stop. In actual measured distance, this would be less than 100 feet . . . the size of the standard marking ring that identifies every airport!

No other make of aircraft approached these all-time records . . . records which prove conclusively that the WACO "225" Straight-Wing is the *practical* ship for you to fly. For though you may never need to take off or land so abruptly, you like to know your ship *can* do it!

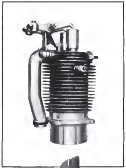
THE WACO AIRCRAFT COMPANY, TROY, OHIO

* * *

WACO airplanes are moderately priced and may be purchased on convenient terms, if desired. Nearly 300 WACO dealers are at your service. Let us arrange a flight demonstration at your convenience . . . and for your satisfaction.

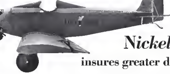
WACO AIRPLANES

"ASK ANY PILOT"



Szekely—S. R.-3 40 H P airplane engine cylinder assembly using Nickel Cast Iron cylinders.

BELOW: "Flying Dutchman" monoplane with S.R.-3 engine Plane and engine manufactured by SZEKELY AIRCRAFT & ENGINE COMPANY, Holland Mich



Nickel Cast Iron

insures greater dependability in Szekely *airplane engine cylinders*

FOR airplane engine cylinders it is essential that the material used be gray throughout, strong and dense in the heavier sections, as well as tough in the lighter cooling fins. High hardness is also required along cylinder bores to insure maximum resistance to abrasion.

In ordinary gray cast iron it is necessary to sacrifice toughness in the fins in order to obtain the essential hardness. Such light sections are therefore white and fragile.

Nickel Cast Iron adequately solves the problem presented by airplane engine castings. It has a well developed structure. The greater refinement of grain, the smaller graphite flakes, and the freedom from hard spots all contribute to superior engine performance. A uniform hardness is obtained throughout the entire length of the cylinder bore and increased wear-resistance is thereby secured.

Because of these characteristics, Nickel Cast Iron is used by well known manufacturers for airplane engines ranging from 40 to 150 horse-power.

Nickel
FOR CAST IRON

Our foundry specialists will gladly discuss your casting problems with you.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

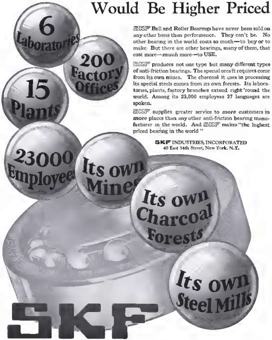
If SKF Wasn't Quite So Big....
"The Highest Priced Bearing in the World" Would Be Higher Priced

SKF Ball and Roller Bearings have never been sold on any other basis than performance. They can't be. No other bearing in the world costs so much—to buy or to make. But there are other bearings, many of them, that cost more—*much* more—to USE.

SKF produces not one type but many different types of anti-friction bearings. The special ores it requires come from its own mines. The charcoal it uses in processing its special steels comes from its own forests. Its laboratories, plants, factory branches extend right 'round the world. Among its 23,000 employees 27 languages are spoken.

SKF supplies greater service to *more* customers in *more* places than any other anti-friction bearing manufacturer in the world. And SKF makes "the highest priced bearing in the world"

SKF INDUSTRIES, INCORPORATED
40 East 34th Street, New York, N.Y.



2439

THE HIGHEST PRICED BEARING IN THE WORLD

SCHEDULED FLYING WILL NOT PERMIT ENGINE TROUBLE

THE remarkable, almost clocklike, schedules that many of the larger air transport companies maintain under practically all weather conditions is due greatly to the means used to assure efficient engine performance.

Fuel and motor oil are chosen with the greatest of care and subjected to most rigid tests. It is significant that throughout the middle west Stanolind Aviation Gasoline and Aero Oils are preferred by the majority of Air Transport Companies.

The performance of Stanolind Aviation Gasoline and Aero Oils have justified their popularity. Thousands of miles of flying service stand witness to the absolute purity and dependability of these specially refined products.

They are available at nearly all airports throughout the Central West.

STANDARD OIL COMPANY
(INDIANA)
910 S. MICHIGAN AVE., CHICAGO, ILL.

Every Sunday afternoon between 2 00 and 3 00 P. M. central standard time, the Standard Oil Company (Indiana) will broadcast the incomparable music of the Chicago Symphony Orchestra over the following stations

WGN	Chicago
WWJ	Detroit
WTMJ	Milwaukee
KSD	St. Louis
WOC	Davenport
WHO	Des Moines
WEBC	Superior
KSTP	St. Paul Minneapolis
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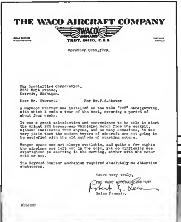

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November 28th,1929.

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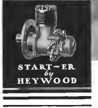

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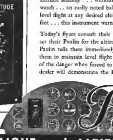

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AVIATION

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A McGRAW-HILL PUBLICATION | ESTABLISHED 1916

EDWARD P. WARNER, *Editor*

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1930

TO PROCLAIM that "the period upon which we are about to enter is the critical one" is so cheap and standardized an oratorical trick for attracting attention that we hesitate to employ it. Much honest thought, however, has failed to produce any other phrase in which the significance of the coming year to the airplane industry can be properly defined.

The industry and air transportation have experienced three years of comparatively steady and rapid growth. Within the last three months we have started around a corner, but we have not yet progressed far enough in the turning to make sure where the next section of the road will lead. At no time since the President's Aircraft Board held its meeting has it been so hard to foretell the immediate future. At no time has it been possible to say with such assurance that the position of the industry three or four years hence will be determined largely by the developments of the next few months.

We shall see revealed, between now and the end of the next flying season in the northern states, the public reaction to a concerted effort to bring air transport within the reach of every traveler. We shall see whether or not the business man, not a few hundreds or a few thousands of him but many times that number, is prepared to use the airplane under favorable conditions—and if it appears that he is not ready to do so, we ought to have a fairly clear idea of the reason.

Nineteen twenty-nine has been characterized by terrifically intense action. Nineteen thirty will be a year offering more opportunity for meditation and ratiocination. Problems which have so far been met under pressure, upon a basis of expediency and extemporization, will be thought through from their fundamentals.

The coming year can lay a firm foundation for a sounder growth than any that the industry has yet had, if it be approached in the right spirit. In that spirit there will be no room for ostrich-like qualities. There must be no evasion of ugly facts. There must be no confusing of forecasts based upon knowledge with roseate dreams based upon hope. The aircraft industry needs no "yes men," but every executive might well include in his own menage a functionary whose sole duty it would be, whenever he made a statement about the future, to look at him cynically and say "Why?" Air transport has a great future, and so has airplane manufacture, but to put ourselves upon the road to a proper realization we must make 1930, among other things, a year for the suppression of comfortable delusions.

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Stainless Steels

THAT the great class of ferrous materials, commonly referred to as corrosion-resisting or "stainless steels," have great possibilities in aeronautical applications, has been predicted and discussed in general terms among the steel and aeronautical trades for quite some time. Despite this general agreement as to potential possibilities, very little of definite engineering utility has emerged. While admittedly individual experimentation is proceeding in many widely scattered airplane plants, from the Atlantic to the Pacific, and with the various

BEGINNING with this issue, the first page is to be devoted to the contents of the magazine. This change is being made in order that the reader may obtain a more complete resumé of the editorial section. The title and authors' names of the feature articles will be carried, and every editorial department will be indexed. In addition, the contents page will mention feature articles planned for the future.

products of a half dozen or more steel producers, nothing of a tangible production nature appears to emerge

Fundamentally, the aircraft industry as a whole utilizes so many widely divergent basic materials that is is impossible for the industry in its entirety to be expert in the many ramifications of each class of material When considering a given class of material, such as stainless steel, aluminum alloy spruce lumber, etc, the aircraft industry has learned to expect that the raw material industry will offer to it a reasonable selection or a single standard of specification of the basic material, so that it can compare and analyze the advisability of that class of material in competition with other classes, on the basis of established physical properties and definite processing practices In stainless steels, however, the aircraft industry is immediately confronted with a multiplicity of trade names, with appended letters or numbers designating various grades of the trade-named product That this situation is founded on highly competitive selling, intermingled with a complex patent situation in the steel industry, does not mitigate the practical handicaps immediately instilled into the aircraft industry's efforts to fix its own position in the matter

In mass production industries, where functional design and operational standards of the completed product are definitely established, it is quite reasonable specifically to analyze a given detail as to material, and to introduce a special grade of a newly developed material for a particular purpose There lies one of the inherent advantages of mass production But in the aircraft field, with the possible exception of the airplane engine industry in a few instances, such a situation does not as yet exist. Expert consultation as to the specification of a separate material for each little detail, with all the inherent difficulties of maintaining and classifying a multiplicity of stock materials of similar yet slightly different nature, with all the special shop processing practices peculiar to each, is not a practical course.

What is really needed is a general specification best suited to average aeronautical use The airplane manufacturer can then carry it in stock The design detail personnel can be acquainted with its physical properties and the shop men can be familiarized with fabrication processes, so that in the first development of an experimental model the material ran be introduced into the original drawings and the original experimental plane. Pressure of time is too insistent for an airplane manufacturer to make a detailed re-study of material selection for a successful experimental model before it goes into production—it goes in as is, at least as far as materials are concerned

So, while individual detail experiments are going on all over the country utilizing various brands and grades of stainless steels for wing ribs, wing beams, floats, streamline wires, exhaust stacks, collector rings, bolts and nuts special individual structural members and engine parts, the results to be attained do not hold great promise for any immediate general application of stainless steels, in aircraft, for they will each after all only establish the utility of a particular kind and classification for a particular specific purpose The success of such experiments may even start a haphazard trend toward stainless steels, with all the dangers attendant upon a faddish application of a material

The correct answer obviously lies in intelligent co operation. If the airplane manufacturers will pool the experimental knowledge they have each gained, not in terms of sales propaganda but in terms of experimental engineering data, through the media of the engineering societies and the technical press so that each may gain in knowledge from the facts discovered by the others, much can be accomplished. If on the other hand, the steel industry will at least temporarily abandon its competitive selling of trade names and classes, and concentrate on the selling of stainless steels as a whole, not in competition with each other but in competition with other basic materials, with all the specialized engineering research upon aeronautical applications which should be a part of such a campaign, much more can be accomplished

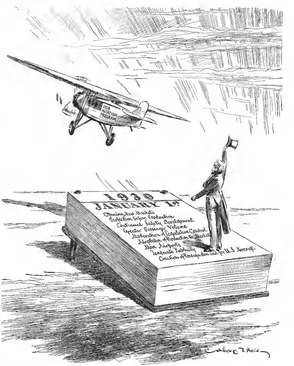
Stainless steels will eventually find some application in the aeronautical industry in this country as they already have in certain foreign countries How broad their field will be remains to be seen The fulfillment will be unnecessarily long deferred unless some cooperative attempt is made to overcome the inherent difficulties plain in the present situation

Airport Restaurants

AMONG the most promising of recent airport developments is the inclusion of modern restaurant accommodations in the plans for many field improvements. The spectacle of thousands of dust-devilled bystanders alternately munching mustard lubricated hot dogs and gazing with morbid intentness at the stunting planes or death-defying parachute leaps being performed overhead has too long been a typical picture of a typical American aviation field

Some leading European airports have operated café gardens adjoining the flying field over a period of years, and there it has been the habit of families on an outing to congregate and watch air travel operations with lively interest while eating a normal meal. Some of the most progressive of American airport managements are working along similar lines

The quicker we place the spectators in clean and attractive surroundings, with at least such service available as are associated with other forms of modern sport and transport, the sooner we will place the operation of aircraft on a par with that of the railroads in the mind of the great and indifferent public.



The Take Off!

TECHNICAL DETAILS OF THE *Dornier X*

International interest has been attracted by the Dornier Do X flying boat, largest craft of its type in the world, which was recently completed and test flown in Germany. The present article is a translation and abstract of a paper delivered by Dr. C. Dornier before the Wissenschaftlichen Gesellschaft fur Luftfahrt (Society for the Scientific Study of Aircraft). The Do.X, as is generally known, represents the most recent stage in the evolution of the Dornier type of design and its development is based on the experience of many years in flying boat design.

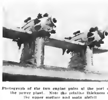
THE DO X may be considered a monoplane flying boat having superimposed on the main wing an auxiliary surface bearing housings or gondolas for six pairs of engines in tandem It is also characterized by relatively short stub wings at either side of the hull, this construction being typical of Dornier practice The engines are Siemens Jupiter nine-cylinder, radial, air-cooled types having 1 . 2 gear reduction and an aggregate output of 6,300 hp. The Do X has a span of 48 m (157 24 ft) and an overall length of 40 05 m (131 25 ft.)

Weights of the craft are shown in Table I which represents a comparison of the actual weights with those estimated by Dr Dornier at a lecture delivered in 1927 A difference in total weight of 2,189 kg (4815 8 lb) or 8 8 per cent is noted or, if the additional weight of the propellers and engines amounting to 782 kg. (1720 4 lb) is deducted, a total additional weight of 1,407 kg (3095 4 lb) for the structure of the flying ship, corresponding to 5 6 per cent, is noted for the structure of the craft

CONSTRUCTION of the Do X took place in the factory of the stock company for Dornier Aircraft, Altenrhein The work was started on December 19, 1927 Launching and first test flights were made on July 12, 1929, providing a total of 570 days for building the craft A large number of special tools, jigs and equipment were required because of the unusual scale of dimensions Assembly of the wing, because of the novel construction, was completed in a relatively brief period of time A great deal of time was spent in the manufacture of templets for construction of the boat panels or frames The portion lying behind the stern step was finished separate from the main hull The keel bearer, which forms the backbone of the structure, was placed on an iron beam and then the boat end was abutted

The upper wing was finished complete with engine gondolas and their bearers, as well as the entire set of control rods for the engine, and the building in of the tower units This entire structure was later superimposed on the wing as a whole

Actual assembly, that is, putting together of wings, boat, steering mechanism and power plant, required 60 days



Photograph of the two engine pairs at the port end of the power plant. Note the relative thickness of the upper surface and main airfoil

DURING the first flights excessively high oil temperatures were encountered and the temperatures of cylinders of the rear engine were also somewhat high The first of these difficulties was remedied in a comparatively short time, but the second required considerable more time, due mainly to the lack of efficient working temperature measuring devices Among the tests made during the trial flight were investigations of the tensions of the more important structural portions of the wing, as well as pressure distribution tests Observations were made optical of spar deflections and the stability was investigated with particular care A series of trimming experiments also was made

Flying properties of the Do X are normal and it was found that power actuated rudders were unnecessary The elevator was supercompensated at first The landing action was smooth normally, but required too great power with unduly great rudder deflection This led to increases in compensation and diameter of hand wheels in the control system

In Fig 1 starting periods have been plotted against flight weight for a large number of trial flights All of these starts took place on Lake of Constance which is more than 400 m (1,312 ft) above sea level Reduced to normal conditions, the curve drawn in dashes would result It must also be considered that the standard Siemens Jupiter engine with compression ratio of 5 3 1 was used According to specification determined in 1927 a safe load of 20 metric tons (44 000 lb) was guaranteed Considering present structural weight this corresponds to a take-off weight of 38 000 kg (83,600 lb) The graph shows that with a calm on the Lake of Constance the craft required 65 sec to meet this condition Reduced to sea level conditions this start would consume 55 sec The predicted maximum speed was not to be below 200 km (124 mi) per hr with a tolerance of five per cent Measurements of this performance were taken with unstreamlined engines at a height of 420 m. (1377 6 ft) and amounted to 211 km (130 9 mi) per hour Reduced to normal conditions, this amounts to 214 km (132 8 mi) per hr , and it is expected that suitable streamlining of engines will result in even greater speed These tests were made with a set of wooden propellers By throttling the engines to 1 850 r p m the speed at a height of 420 m (1377 6 ft) was 175 km (108 4 mi) per hr

THE RELATION between range and useful load is shown in the diagram in Fig 2 This range was ascertained by taking as a basis an average operating fuel consumption (gasoline and oil) of 270 grams (0 594) per hp -hr , assuming a uniform throttling of all engines The distances in kilometers are plotted as abscissæ and the useful loads in kilograms as ordinates Inclined lines correspond to take off weights ranging from 45–52 metric tons (99,180-114,608 lb) In this graph the additional naval equipment, crew and equipment of passenger cabins was deducted to obtain the net useful load Nautical equipment was assumed constantly to be 500 kg (1,100 lb), the weight of the crew 1 000 kg (2,200 lb) and the weight of equipment indicated by a line which, at distance zero, corresponds to 2,000 kg 4,400 lb) in order to reach the zero point at 4,000 km (2,480 mi)

Vertical distances between the equipment lines and the strongly inclined lines corresponding to the different load conditions give the weights available at any time as useful load It is seen from the diagram that the largest distance that can be traversed in a non-stop flight is shown to be about 3 600 km (2,232 mi) For pronounced long-distance flight more economical engines would be necessary Reduction of the present average fuel consumption from 270 to 220 grams per hp -hr (0 594 to 0 484 lb) would entail an increase in the range from 3,600–4,400 km (2,232–2,728 mi) A substantial increase in range is expected as soon as it is possible to incorporate a clutch mechanism between propeller and engine, making it possible to stop individual engines entirely in economical flight.

INSOFAR AS POSSIBLE experimenting was eliminated from the beginning of the design work for this reason some restriction was placed on creative possibilities in the design The advantage in adhering as closely as possible to conventional standards was proven by the fact that, from the moment of the preliminary laboratory

Front view of the Do X showing the relative size of wing stubs, and upper surface reinforcing engine housings.

tests to the final completion, only a few hundred working hours were lost in making changes in the structure.

The preliminary work on the first plan dates back as far as 1924 It was definitely determined in the beginning that a plane of such great load carrying capacity must necessarily be a boat with central hull The second question of importance was that of mono or multi-plane, and the decision of monoplane was quickly reached The first plan drawing is dated September 27, 1924, and after certain modifications the final plan was arrived at on June 21st, 1926 Both the boat, 6 m (19 68 ft.) wide, which was provided for at first, and particularly the hull which was subsequently executed, were carried out experimentally in actual size from wood with complete steering mechanism

On December 22, 1926, work was started in the construction department and, with the exception of a change in the shape of the wing stubs, only slight changes were made in the original plan

The third question of importance was that of power distribution The first design of 1924 provided seven engines totaling 4,200 hp Twelve engines totaling 5,800 hp was considered subsequently Because of the subsequently increase in the capacity of the engines used, the present power plant totals 6,300 hp. The final decision to employ a greater number of engines was arrived at so that engines of lower power and therefore greater reliability could be chosen Another difficult problem in connection with the power plant was the disposition of engines as well as the decision as to the use of water or air-cooled types. Two years were spent in conducting tests to decide how the engines should be arranged in the craft. The present arrangement was reached as the best compromise under the circumstances. Air-cooled engines were chosen because their use represented a saving in weight of more than 3,000 kg. (6,600 lb) It was considered that this saving in weight was sufficiently important to offset the relatively smaller fuel consumption of water-cooled engines The large number of units made tandem installation compulsory

The reference data for the aerodynamic calculations of the design were obtained by experiments in Gottingen and in the wind tunnel of the Zeppelin Aircraft Works and the unusual scale of the models presented definite problems

As the small wing structure placed above the main wing has caused considerable discussion, the polar curves are herewith presented. In Fig 3 the lightly drawn curve *A* represents the polars by eliminating the upper wing and the engine gondolas and their supports, thereby corresponding to the ideal condition with power plant completely arranged within the boat or wing and without additional resistance created by the cooling of the engines and the support of the propellers The heavy line *B* is

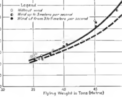


Fig 1

the polar curve in the present condition and in gliding flight Dash line *C* indicates the polar of the present airplane with propellers running as in flight and the dot and dash line *D* corresponds to the model with gondolas and their bearers, but without the auxiliary surface The reference area is the surface of the main wing It is noted, therefore that, at small angles of attack, the use of the auxiliary surface entails only a small reduction in resistance To this slight reduction in resistance is added a substantial increase in lift at larger angles of attack The ideal case (curve *A*) is obviously unattainable in actual practice

Engines placed in the wing or hull must be cooled and, disregarding the use of wing radiators, this cooling entails a sacrifice in power and in speed If propellers are freely arranged, heavy gears are necessary and lead to mechanical uncertainties and additional resistances

The same applies to driving a propeller by two or more engines In this case the necessarily large propeller diameters render it difficult to place the propellers in such a position that they have sufficient protection against splash water Experience has shown that substantial difficulties are encountered in accommodating the required propeller diameters in a reasonable manner for capacities as high as 6,000 hp The fact that the arrangement of propellers above the wing greatly enhances the lift is generally known today A thorough examination of the possibility of using pusher propellers at the edge of the wing and engines within the wing was made and it was found that the extremely long shafts and difficulties of arranging for their bearings would necessitate additional weights which would offset the aerodynamic gain

Table 1: A Comparison of the Actual and Estimated Weights of the Do X

Construction Group	Status of Weights: In April 28 at the Time of the Lecture	Weighed on August 31, 1929	Corrected Weights According to Lecture	Difference between the Weights in Columns 1 and 3: Plus	Per Cent	Minus	Per Cent
1 Wing with support	7 475 8	7 559 4	7 559 4	83 6	1 1		
2. Steering gear	728 7	878 2	878 2	149 5	20 6		
3 Steering	322 5	363 5	363 5	41 0	12 7		
4 Boat	7 235 3	8 314 0	8,314 0	1,078 7	14 9		
5 Engine gondola with gondola bearer	1 072 7*	1 147 2	1 147 2	74 5	8 9		
6 Cooling	350 0	350 0	350 0				
7 Engine	4 721 0	5 121 6	5 121 6	400 6	8 5		
8 Exhaust plant	39 0	39 0	39 0				
9 Propeller with hub	720 0	1 101 9	1 101 9	381 9	53 0		
10 Engine regulation	350 0	226 9	226 9			123 1	35 3
11 Gasoline plant	919 0	1 236 4	1,002 4	83 4	9 1		
12. Oil plant	274 5	359 6	300 5	26 0	9 5		
13 Oil and gasoline in lines or conduits	120 0	120 0	120 0				
14 Operating mechanism supervision	130 0	278 2	109 5			20 5	15 8
15 Flight supervision	6 9	13 9	6 9				
16 Navigation	1 5	36 0	1 6				
17 General implements	30 4	80 0	30 4				
18 Auxiliary operating implements	194 8	417 5	188 0			8 8	0 3
19 Nautical equipment	250 0	270 7	270 7	20 7	8 3		
	24,942 1	27 914 0	27 131 7	2,339 9		150 4	
Totals in lbs	54,873	61,411	59 698	5 148		331	

A GREAT DEAL of attention in the investigation period was occupied by questions of structural nature A full cantilever execution of the wing was refrained from in order to obtain as light a surface as possible In the choice of the semi-cantilever wing considerations of a manufacturing technical nature were the determining factors

The wing of the Do X is a three spar trebly supported cellule This system provides particular stiffness and resistance to torsion. Furthermore, it affords a guarantee that injuries to a wing strut or spar cannot jeopardize seriously the carrying capacity of the entire system

The wing has a rectangular plan form with slightly rounded tips The span is 48 m (157 44 ft), the depth 9 5 m (31 16 ft) and the total projection area, including aileron in the upper wing, is 486 2 sq m (5231 51 sq ft) The weight of the wing complete with ailerons, upper wing structure and all bracing is 7,559 kg (16,629 8 lb), the unit weight of the wing being 15 5 kg per sq meter (3 16 lb per sq ft) The wing with a total weight of boat of 52 metric tons (114,400 lb) corresponds to the DVL regulations covering passenger transportation which are in force at the present time.

The central spar lies approximately in the position of maximum profile height Front and rear spars are moved far apart, their distance from the central spar being 2 8 m. (9 18 ft). The distance between the individual cross members is as high as 3 6 m (11 80 ft)

The upper wing is not used for relieving the main supporting surface and, statically considered, it merely serves for stiffening the engine bearers. With the exception of some steel fittings the entire wing frame work is made of aluminum alloy This material was used because of the difficulty in procuring appropriate steel sections in the required dimensions

A cross-section and a view of a part of the central spar at the connecting point of the strut are shown among the accompanying illustrations Flanges of the spars are made of pressed aluminum alloy angles and lamellas similar to those used in bridge building and additional lamellas or segments are provided as required. At points of lower flange loading the vertical webs of the angles are milled out for purposes of decreasing the weight In construction the front and rear spars are similar to the central spars. At this point it is of interest to note an experience that occurs in increasing dimensions not only of spars but of other structural members This is the decrease of the amount of work expended per unit of finished construction weight with the increase of dimensions of structural members The determining factors in expenditure of work are chiefly the number of panel points and the number of rivets In the spars of the Do X there are an average of 2 5 panel points per running meter, the corresponding numbers in the Dornier Superwal being 3 3 and in the Wal 5.2 In the Do X there are 9 8 rivets per kilogram of finished spar weight, while in the Superwal there are 33 and in the Wal 44.

Many months were expended in determining the ultimately adapted spar construction Special experimental apparatus was designed particularly for this purpose. On account of the unusually great test load to which the spars were submitted important foundation work was necessary to render the experimental apparatus undisplaceable The customary method of loading the spar with sand bags or iron ballast was discarded and it was decided to arrange receptacles filled with water at points of concentrated loading This method gave good results Particular attention was paid to the conduct of the spar within the elastic range and tensometers were employed to ascertain the tension in various structural members

Control measurements of the tension in structural members of the central spar were conducted with a Maybach instrument placed at the disposal of the Dornier Company by the German Experimental Institute for Aviation, which organization also co-operated in the use of this instrument Fig 4 shows the deflections measured and calculated for the central spar at different load stages

The cross members are also made of pressed profiles in the main At their point of connection with the flat spar it was partly necessary to build in frames in order to facilitate passage through the wings The fields formed by cutting down the cross members arranged at distances of from 2 8 to 3 6 m (9 18 to 11 80 ft) with

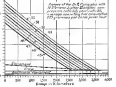


Fig. 2

the three spars are covered by plates resistant to bending and covered with fabric and sheet metal These units have been called "wing skin fields" The portion of the wing lying behind the rear spar is constructed as an independent deck. The nose is made entirely of metal and employed for stiffening or bracing the front spar against buckling The wing skin fields are simply and cheaply made and easily mounted Their attachment to the main cellule is affected by connections with bolts lying entirely within the wing Although the wing has not an exceptionally heavy profile, the height of the spars, due to the total dimensions of the craft, is so substantial that even in flight it is possible to walk on nearly all parts of the wing

As previously mentioned, the upper wing serves for a reciprocal stiffening or bracing of the engine bearers and is made entirely of metal It turned out to be relatively heavy, since its own weight amounts to 18 kg per sq m (3 68 lb per sq ft) In reducing deformation and possible vibration to a minimum, too much apparently has been done in this case The unit weight of the total wing previously mentioned as 15 5 kg. per sq.m. (3 17 lb per sq ft) includes the weight of the upper wing This excessive weight, therefore, affects the total unit weight unfavorably. In order to eliminate inadmis

sible additional strains on the main system the ends of the upper wing are displaceably joined to the central portion between the two outer gondolas The engine bearers are a frame work construction and sheathed in streamline fashion For purposes of accessibility doors are provided at both sides.

AS PREVIOUSLY MENTIONED, the decision that the craft must be a boat with central hull was made early in the design work In the first place, it was considered desirable to achieve the necessary stability without resort-

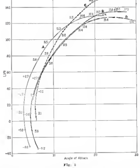


Fig. 5

ing to supplementary displacement bodies Experiments indicated, however, that this was not possible on the scale under consideration without involving important disadvantages The designers, therefore resorted to the idea of wing stubs which had proved its usefulness during a long period of experience in Dornier flying boat design

The hull lines below the water, in so far as they affect the starting process, were but slight modifications of those used in former Dornier craft The central longitudinal step is retained and is horizontal crosswise to the direction of flight at its rear end, passing into a slight "V" shape toward the front The portions of the hull bottom lying at the sides of the longitudinal step are given a slightly concave shape. The fore-body is keeled particularly in portions which at the start lie in quiet water. At the places where the stubs penetrate the hull they are rounded off strongly cross-wise to the direction of flight The height of the stubs at the root, therefore, become substantially greater, making possible a considerably more rigid construction of supporting members At the start the water is accelerated outward, due to the arch in shape while in the former designs it was

compressed in the corner between the under side of the stub and the side wall of the boat

In Fig. 5 at the right-hand side a diagrammatical cross-section of the main step of the Do X is shown at the left for purposes of comparison with that of a corresponding section through the Dornier Wal at the right It is noteworthy that the ratio of the width *B* of the boat measured over the stubs decreases to the width *b* of the hull proper as the size increases While this ratio is about 2.92 in the smallest Dornier boat (the "Libelle" which has a take-off weight of about 670 kg) [1,474 lb], it drops to 2.46 in the Wal type and 2.12 in the Do X flying boat In the future boats of about 100 metric tons (220,000 lb.) it will be possible to employ stubs of a rudimentary character and in boats of still larger dimensions, the stubs can be eliminated altogether

An essential characteristic of the hull design of the Do X is the division into three independent decks which has been carried out for the first time in aircraft in this design The uppermost deck is reserved for the commander and contains accommodations for him and for the pilot as well as a control room and rooms for radio and auxiliary apparatus The next deck is intended exclusively for passengers and is 23.5 m (77.08 ft) long 2 m (6.56 ft) high and 3.5 m (11.48 ft) wide at the widest place The lowest deck contains operating mechanism and space for provisions, supplies, freight and baggage.

The overall length of the boat is 40.05 m (131.36 ft) and the width measured over the stubs is 10 m (32.80 ft) The width exclusive of the stubs is 3.5 m (11.48 ft) The maximum height is 6.4 m (21 ft), while the draft empty is 0.8 m (2.62 ft) and with 50 metric tons (110,000 lb) is 1.05 meters (3.44 ft) With 50 metric tons (110,000 lb) the metacentric height is 4.58 meters (15.60 ft) Including the stubs the boat has a total volume of 400 cu m (14,124 cu ft) This is four times as great as the volume of the Superwal

The main spar element cross-section without stubs has a content of 17.2 sq m (186.8 sq ft) The panel distance is 0.7 m (2.29 ft) A total of 58 cross panels is used. One of the innovations in the structure is a keel bearer 23.3 m (76.5 ft) in length running from the bow to the end of the stern step and having a maximum height of 2.12 meters (6.96 ft) which produces a substantial stiffening of the boat Keelsons are arranged at the right and left of the keel bearer at distances of 0.9

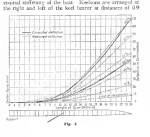


Fig. 4

and 1 58 m (2 95 and 5 19 ft). This in conjunction with the cross panels produces a high efficiency compound effect Throughout the range of the boat bottom which is directly exposed to the strain produced by waves the exceptionally strong bottom plates are divided into fields of about 0.63 sq m (6.84 sq ft.) by crossing transverse and longitudinal panels

In the construction of the cross panels an attempt was made wherever possible, considering the weights available, to make use of pressed profiles It is interesting to note at this point that the weight per cubic meter of boat volume in the "Libelle" is 29.9 kg per cu m. (1.86 lb per cu ft), in the Wal is 26.2 kg per cu m. (1.63 lb per cu ft), and in the Do X is 21 kg per cu m. (1.3 lb per cu ft) In spite of this fact the stresses on the material, assuming equal loads, are substantially less in the Do X than they are in the smaller boats The larger craft, in so far as local stresses are concerned, is not in a much more fortunate position than the smaller ones in which the small wall thicknesses of the sheet metal and profiles used are more susceptible to the danger of local dents and upsets Both hull and stubs are subdivided into a large number of bulkheads, the boat having nine water-tight compartments and each stub having four The reserve displacement is exceptionally large Displacement of the stubs alone amounts to 43.5 cu m. (1,534 cu ft).

AREA of the horizontal tail surfaces amounts to 53.4 sq m (579.5 sq ft.), while that of vertical surfaces is 19.0 sq m (204.4 sq ft) All rudders are balanced by auxiliary surfaces Elevator clearance above the water line is 6 m (19.68 ft) and extension of the fuselage to the rear protects the side rudder against the jar of the water Rudders are actuated by traction rods suspended from pendulum levers The rods are mounted entirely in ball bearings

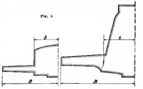
Trimming balances are built into the surfaces, the trimming being accomplished by setting the angle of attack of the corresponding compensating surfaces This eliminates the necessity of employing power of any kind, and the control can be operated effectively from the pilot's seat A portion of the commander's deck intended for the pilot is shown in one of the accompanying illustration The two small laterally disposed hand wheels are used for trimming and the large hand wheel serves to actuate the water rudder Normal wheel steering is employed

THE TWELVE ENGINES are rated at 525 each They are radial, air-cooled, types having a gear ratio of 1:2 Special attention is given to the design of the engine bearers, the structural members entering into these units being of especially large dimensions The preliminary investigation of these units included ascertainment of the stresses in an engine mounting subject to combined thrust and turning moment as well as the weight of the engine.

One of the important features in the Do X is the fact that, probably for the first time in aircraft history, the pilot has been relieved of the task of supervising the power plant Of course the pilot has all of the engines under his immediate control if necessary This is accomplished by means of two levers lying directly beside each other and which can be operated jointly by a single grip. Operation of one of the two levers provides the possibility of throttling the starboard or port group of engines, this being particularly useful for maneuvering on the water All engines can be cut out simultaneously from the pilot's seat

Two collective revolution counters and an electric annunciator apparatus are included among the other engine instruments The annunciator device consists of twelve small lamps, each assigned to an engine and so

Fig. 6



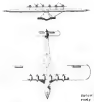
connected that they light when the engine is stopped Complete separation of engine supervision from the pilot is predicted in the future

Starting, long distance supervision and normal stopping of the engines are handled from the control or switch room Connection between the control room and the engine gondolas is made through a tunnel leading through the wing Engines are started by compressed air which is produced by a small compressor operated by a separate gasoline engine which also serves to produce the entire electric current for the aircraft

THE fuel system in general is similar to that used in the former Dornier planes In the operating fuel deck normally four cylindrical receptacles of 3 000 l. (792 gal) capacity each, as well as four additional receptacles of 1,000 l (264 gal) capacity each, are provided, providing a total gasoline capacity of 16,000 l. (4,224 gal) space These tanks are placed directly on the bottom of the boat and communicate with a so-called collecting pot from which fuel is forced by means of pumps to two receptacles, each having a capacity of 300 l (79.2 gal) space in the wing nose In order to provide a high degree of safety in the fuel system, gasoline may be pumped in three different ways, i e , by a pump with windmill drive, an electrically operated pump or a hand pump On the nose tanks the gasoline is fed to the carburetor, also by means of pumps, and excess fuel flows back into the collecting pot Sight feed gages on the commander's deck permit control of the fuel supply Piping is easily accessible and can be reached at all times, even when the plane is in flight Oil tanks in the wing have an aggregate capacity of 1 600 l (4,224 gal)

The specifications of the Do X are as follows

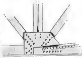
Wing Span	48 m. (157.24 ft.)
Overall Length	40.05 m (131.25 ft)
Weight Empty	27,914 kg (61,410.8 lb)
Useful Load	20,000 kg (44,000 lb)
Maximum Speed (Sea Level)	214 km (132.8 m p h)
Cruising Speed {1,850 r p.m / 420 m / 1,377 ft}	175 km (108.4 m.p h)
Power Plants	12 Siemens Jupiter, 525 hp each,
Total Power Plants	6,300 hp

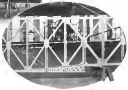


Right: The finally adopted plan followed in the construction of the Do X

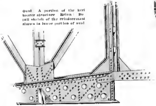
CONSTRUCTION DETAILS OF THE *Do. X* FLYING BOAT

Below: Photograph of the hull structure during the early stages of assembly at the factory. Right: Detail sketch of the joint shown in the lower left hand corner of oval below

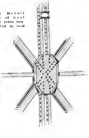




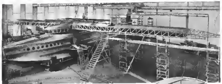
Oval: A portion of the keel beam structure. Below: Detail sketch of the reinforcement shown in lower portion of oval



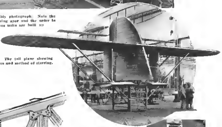
Right: Detail sketch of keel beam construction in oval



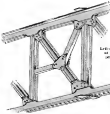
Below: Assembly of the power plant unit.



Above: Final assembly photograph. Note the construction of the wing spar and the order in which the various units are built up

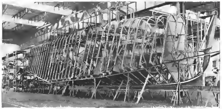


Right: The tail plane showing balances and method of steering.



Left: Construction detail of the spar shown in photograph at right

Right: Photograph of a portion of one of the wing spars. All three are similar in construction



Right: Completed hull structure ready for application of the skin or covering

DEVELOPMENT OF THE "*M*" *Wing Sections*

By MAX M. MUNK
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A Discussion of the Results of a Systematic Series of Model Tests of Mathematically Derived Wing Sections

THE "M" SECTIONS constitute a family of wing sections the aerodynamic characteristics and shape of which were published at first in 1926 [Max M Munk: Model tests with a systematic series of 27 wing sections at full Reynolds number, *N A C.A. Techn Rept No 221*] Their shapes were varied systematically in order to find good ones and to learn about the influence of the variations It was the author's first attempt at proceeding in such a way, for the Goettingen sections follow no strict system Several airplane designers have adopted the outstanding "M" wing sections since then, with good results This seems to indicate that it is still possible to improve the existing wing sections, for if we had already exhausted the possibilities, the first attempt of a systematic exploration would not have yielded sections that were immediately adopted by the industry. It seems further to indicate that we were on the right track in the layout of the first systematic series of wing sections designed for experimental exploration, and that we should continue along the same line Further attempts to improve wing sections by systematic tests did not find support when this first series was finished It is the purpose of the following article to arouse interest in such further exploration and to explain the principles adopted for the layout of the first series of the "M" sections to serve as a guide for further research along that line

The "M" wing sections are so-called mathematical wing sections There are two classes of such curves The first and older class, the chief representatives of which are the Joukowsky sections, are curves not merely determined by mathematical rules, but furthermore determined in such a special way as to make it possible (though not exactly easy) to draw the theoretical streamlines created by such sections and to compute the theoretical air forces They are contours of mathematical stream lines Such wing sections are not necessarily superior in any way to other classes of wing sections The Joukowsky wing sections in particular have never found extensive practical application, because they are too thin in their rear portion and have not enough thickness for the rear spar The aerodynamic characteristics of some of them are quite desirable, although with these good ones the travel of the center of pressure is a little large

The importance of wing sections with a background of theoretical flow was always chiefly academical, and was further diminished in 1922 by the author's discovery of a simple mathematical method for computing the theoretical aerodynamic characteristics of all wing

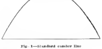

Fig 1—Standard camber line

sections, mathematical or not and with or without mathematical streamlines We shall come back to this method, because it has also been used in the layout of the "M" sections

The other class of mathematical sections, those without the background of special methods for computing the theoretical flow, are drawn by the guidance of simple mathematical rules or formulas, for practical reasons only This method of layout assures the greatest possible continuity of the contour, and thereby improves the aerodynamic properties Furthermore, it makes it easy to obtain families of sections which vary systematically, and for which the results of the tests can easily be classified, and intermediate sections drawn by interpolation The fact that for every empirical section a curve determined by mathematical equations can be found so as to agree practically with it, shows sufficiently, that the mathematical sections are not as such necessarily good ones or better than the purely empirical curves, drawn by the designer from experience and artistic feeling The "M" sections subordinate themselves to this class of mathematical sections They are themselves simple mathematical curves, but they are not the contours for simple mathematical streamlines. Aerodynamic viewpoints contributed to their shapes in quite another way M-1 to M-27 were intended to be the first series of a more ambitious program For the purpose of systematic exploration all wing sections were classified according to their thickness, their effective camber and their effective S-shape. Subclassifications were left to the future The thickness is required for structural reasons, and affects the aerodynamic properties of the section considerably The effective camber and S-shape are not limited by structural considerations, but are fully at the disposal of the designer for influencing the aerodynamic properties to the best advantage A large thickness increases the minimum profile drag, but may raise the maximum lift and spread out the range of a fairly good performance The camber and S-shape have to be considered together. The ratio of their magnitudes determines the travel of the center of pressure, also called the stability of the wing section The camber by itself increases the maximum lift and the lift for maximum profile drag, but also increases the travel of the center of pressure The S-shape diminishes this travel, but also the maximum lift, and increases the minimum profile drag The problem is to find the best combinations of these three characteristics, giving the best compromise Wind tunnel tests at full scale Reynolds number were accordingly started with sections combining three very simple mathematical curves chosen to represent each of the three mentioned principal geometrical characteristics of the section The curves were selected primarily from the experience of former wind tunnel research in combination with a simple mathematical formula Their choice was influenced, however, by the nature of certain integrations, which have to be per-

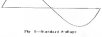

Fig 2—Standard S-shape

formed with the ordinates of the sections in order to compute their theoretical aerodynamic properties The shape of the curves makes these integrations relatively simple This was not, however, considered a point of prime importance, but it happened that such shapes also looked promising with respect to their aerodynamics

Before proceeding to discuss the three curves which make up the "M" sections, it is necessary to review in a few words the principles of the general wing section theory A wing or wing section, now considering plane flow only, is a deflector of air Since air deflection is the vocation of a wing, no contraption deflecting oncoming air downward can avoid creating a lifting force, thereby performing the duty of a wing This deflection takes place along the whole length of the wing section along its whole chord, but not with equal intensity at all

Fig 3—Standard thickness curve reduced to one-half

points The intensity of the deflecting process depends on the direction in which the wing section extends at each point, in conjunction with its position relative to the leading and trailing edges, the wing section elements in the rear being better able to impress their direction on the airflow than those near the leading edge.

The conditions at the leading edge and the trailing edge are of particular interest Observation has shown that, unless "burbling" has started, the air is always actually deflected to flow parallel to the rear edge on both its sides, upper and lower. Not so at the front edge The air arriving there is just beginning to be subjected to the deflecting action of the wing, and the result is still imperfect At all but one angle of attack, where the conditions happen to be favorable, the air fails to strike the section at the leading edge and to flow parallel to the forward portion of the section on the upper and lower side of its nose It rather strikes sideways and flows around the nose, either from bottom to top, at large angles of attack, or from top to bottom, at small ones A round leading edge facilitates this flow around the nose, and thus spreads out the range of a fairly small profile drag It increases, however,

the minimum profile drag, when the air strikes the leading edge directly in front and hence no flow around takes place. At the one angle of attack the air flows parallel to both leading and trailing edges not merely parallel to the trailing edge only as it does at all other angles This is therefore the angle of attack of the most perfect condition, the air flowing parallel to the section along its entire length The section would be designed, in that way were it to be used at one angle of attack only as in the case of certain fan blades, but unfortunately this is not true of airplane wings

The thickness of the wing section at its different stations along the chord has a decided influence on the choice of the roundness of the leading edge, and it further influences the profile drag and the maximum lift that is the lift at which the burbling sets in The thickness is of secondary importance to the deflecting action

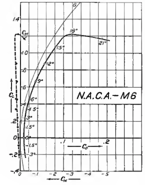

Fig 4—Polar curve of M 6 section

of the wing section and to the distribution of this deflecting intensity along the chord It has been found convenient in the investigation of this deflection to replace the section mentally by its median curve a wing section without thickness or flesh but otherwise of the same shape as the actual wing section The median curve is the line of equal distance from the lines of upper and lower camber and its direction represents the direction of the wing section at each station It can be assumed that the median curve causes the same deflection as the actual section, and that it is its fully

acknowledged representative for the investigation of this deflecting action For instance again taking up the angle of minimum profile drag, the air is flowing simply along the median curve Hence, moving the wing backward instead of forward but without change in direction relative to its motion would not change the magnitude of all velocities at all, but would reverse their direction All pressures would therefore, remain unaltered and we recognize that the angle of attack of minimum profile drag is determined by the condition that the lift remains equal when the leading edge and the trailing edge change places

Consider now a symmetrical median line, with equal front and rear halves as for instance a circular or a parabolic arc The condition just outlined obviously takes place when the chord is parallel to the motion The entire flow is then symmetrical with respect to a vertical through the center of the wing The oncoming air strikes the wing at its leading edge This symmetry enables us to state without further computation the position of the center of pressure It is necessarily at 50 per cent of the chord at the center of the wing section. The magnitude of the lift depends on the shape of the median curve more particularly on its average curvature, or on the maximum camber of the median curve in conjunction with the character of its shape This now can be used in turn for the most natural definition of the average or effective camber of a wing section We propose to define the effective camber of a wing by its theoretical lift at the angle of attack zero of its median line and to measure it by the angle of attack of a straight line having the same lift under otherwise equal conditions

The effective camber can be determined either analytically or graphically or by a numerical process We divide the median line into small elements and sum up the deflecting actions of the single elements This deflecting action is more perfect near the trailing edge than near the leading edge Hence the camber of an element is more effective if the element is located further behind This argument can be carried through by means of higher mathematics and leads then to the use of influence factors for the different elements larger near the trailing edge than near the leading edge and depending on the position of the station only The camber at each element of the median line has to be multiplied by its influence factor and the single deflecting actions summed up in order to obtain the total deflecting action, and therefrom the lift Such summing up of many small effects is called integration in higher mathematics and this explains why the lift of a section and hence its effective camber can be obtained by integration, which can either be performed analytically that is by using formulas graphically, by drawing lines or numerically by actually adding up the effect on the adding machine

We proceed next to the discussion of the center of pressure motion We consider at first the center of pressure at the angle of attack zero of the median line It was seen to be at 50 per cent if the section is symmetrical with respect to its center In other cases it may be, but probably is not at that point If not the lift multiplied by the distance of the center of pressure from this center at 50 per cent as lever arm gives a moment of the airforce It is this moment of the air which we discuss further It is an undoubtable indication of the lack of symmetry of the section Such lack

of symmetry is most pronounced with curves passing through the chord at 50 per cent and extending below it on one side say in rear and on top of it in front Since the curve is supposed to intersect with the chord at its ends (this is just the definition of the chord) such curve has the shape of the letter S Any asymmetric curve can be said to be composed of a symmetric one and of one resembling more or less the letter S viz composed of the two curves in such a way that its distance from the chord is the sum of the individual distances of these two curves We will therefore, go a step further and not only consider the effective camber of a section referring to its geometrical characteristics resulting in lift at the angle of attack zero, but also of its effective S-shape referring to the creation of an air moment around 50 per cent of the chord at the angle of attack zero This effective S-shape is again measured by the angle of attack of a straight line giving the same moment under conditions otherwise equal We have not to define any standard S-shape, as little as any standard camber line This is made unnecessary by the foregoing definitions We wish merely to remark at this point that an S curve that is symmetrical that means having equal ordinates of opposite directions at equal distance from the center (Fig 2) possesses not only effective S-shape but also effective camber the camber of the rear elements exerting stronger deflecting effect than the equal cambers of the corresponding front elements thereby creating lift

We proceed to the airforces at angles of attack other than zero Turning the section from its zero position to a positive angle of attack increases the camber of each element in proportion to its distance from the axis of turn say the center of the section The distribution of this change of camber is equal for sections of all shapes including the straight line. For this reason the influence of the change of the angle of attack on the deflecting action is also equal By increasing the angle of attack airforces are set up that add or superpose to the airforces created at the zero angle. These depend only on the magnitude of the angle not on the shape of the section They can therefore be computed by investigating the special case of a section having a straight median line We consider next therefore the lift distribution of a straight line under a positive angle of attack Its deflecting action is more concentrated near the leading edge than farther behind because it is there that the airflow is being deflected into the direction of the line Once having assumed the direction of motion parallel to the straight line no further deflection is caused On the other hand we have seen that the deflection does not take place instantaneously near the front edge but requires some time and distance It can therefore be expected that the center of pressure of a straight line is forward of 50 per cent and the computation performed by means of an integral similar to the one discussed for the computation of the lift consisting in summing up the cambers multiplied by their influence factors gives indeed 25 per cent for the position of the center of pressure of a straight line This gives then the moment around the center if the lift is known

We have now reached the point where we can draw important conclusions Suppose the angle of effective camber and of effective S-shape to agree At the angle of attack zero then the lift as well as the moment agree with those of a straight line at the angle of attack equal to these angles Hence the center of pressure is at

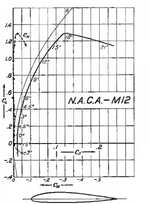

Fig 5—Polar curve of M 12 section

25 per cent Any change of the angle of attack does not move the center of pressure, as the additional airforce attacks again at 25 per cent Otherwise speaking if the center of pressure is once at 25 per cent, it is always there and is fixed and does not travel at all A fixed center of pressure of a wing section is necessarily at 25 per cent This takes place if the angles of effective lift and effective S-shape are equal In all other cases there is a travel, but it is always of the same general type and depends on the magnitude of the difference of the two angles

This theory is well confirmed by experience The constant center of pressure is generally found between 25 per cent and 24 per cent We must forbear at this time to go further into the discussion of these interesting and important relations as enough has now been said to acquaint the reader with the underlying thoughts which lead to the design of the "M" sections

The M sections are based on three individual curves, the ordinates of which were multiplied by different constants and then added to each other thus furnishing the ordinates of the upper and lower camber lines of the sections The median line for camber is a common parabola (Fig 1) through the leading and the trailing edge and the point of maximum camber at 50 per cent of the chord With the small curvatures occurring with practical wing sections this parabola practically coincides with a circular arc In Fig 1 drawn to a maximum camber of 50 per cent the difference between the parabola and a circular arc is pronounced An S curve is obtained by multiplying the ordinates of the parabola by

the distance of the station from the center. It is drawn in Fig 2 for an inclination of 45 deg at the center, the tangent of this angle being 1 The tangent of the inclinations at the ends is twice that large This is a symmetrical S curve rather than a curve of exclusive S effect. It has also actual effective camber The angle of effective camber of the parabola is equal to the angle between the chord and the line of connection between the trailing edge and the maximum camber at 50 per cent chord Its S-effect is zero The S curve in Fig 1, with 45 deg inclination at the center, has half the effective angle of camber than the parabola with 50 per cent camber in the same figure. Assuming the right side to be the trailing edge, the camber of the S-curve is negative Its angle of effective S-effect is half of its angle of camber, but positive.

By a suitable combination of these two curves a curve of fixed center of pressure can be obtained One unit parabola (50 per cent camber) combined with two unit S curves (45 deg inclination) gives a pure S curve, having S effect but no camber effect Three unit parabolas and four unit S-curves combine to produce a curve of equal camber and S effect, that is a curve of constant center of pressure Otherwise stated, the ordinates of the S curve in Fig 1 have to be multiplied by a factor 4/3 times as large than the factor for the parabola in order to obtain a curve of a theoretically fixed center of pressure For the design of the "M" sections, several combinations were used, the ratio of the factors varying around 1.33, between 1.00 and 1.50

The thickness curve at last was obtained from the ordinates of a parabola through the leading edge with the chord as horizontal axis These ordinates were multiplied by the distance from the trailing chord The unit thickness curve, their ordinates reduced to one half, the maximum thickness being then 54.433 per cent of the chord, is shown in Fig 3. The maximum thickness of the unit thickness curve is 108.867 per cent and is located at 33.33 per cent of the chord The three basic curves are thus seen to be chosen as very simple algebraic curves We did not, in spite of certain advantages, take sine curves for the camber and S curve, dividing the chord in 180 deg and 360 deg and plotting the sine The integrations for the effective cambers are then more difficult and, moreover, it is not possible to obtain a simple thickness curve that way

M-1 to M-3 are obtained directly from the thickness curve, by multiplying it by suitable factors in order to reduce the thickness to different maximum values. It was, however, necessary to add a small thickness near the trailing edge, in order to avoid too sharp and vulnerable an edge These three thickness curves were first combined with two camber curves, obtained in turn by combining one standard S curve with either two thirds of the ordinates of the standard parabola or with one times its ordinates One tenth of these ordinates were taken as fundamental camber lines, designated by "a" and "b" These were then again combined by doubling them, adding each curve to double the other one and by doubling both and adding them to each other. In this way eight camber curves are obtained, the combinations having an even smaller theoretical travel of the center of pressure than the original camber curves, "a" and "b." The tests bear out that actually wing sections of small or zero travel were obtained.

The first 27 M-sections constitute therefore an exploration in the region of small center of pressure travel A small travel is desired by most designers, although the advantage is not decisive, and there is in particular no advantage in having the travel entirely eliminated It is, however, a fact, that sections with straight median lines (strut sections) show a remarkably small minimum profile drag, but are deficient in maximum lift It appeared, therefore, promising to try to increase this maximum lift without impairing the minimum drag maintaining the absence of a large travel of the center of pressure, by adding some S and camber neutralizing each other almost or fully. This possibility suggested itself, furthermore, because this range of combination was little explored at that time The results have justified the expectations. It appeared that a small camber and S gave good results, and that small variations of the ratio of the camber to the S did not affect the result much. The best sections were the thickest ones combined with the smallest cambers, M6 and M12 Their polars are reproduced in Figs 4 and 5 from the original paper.

The author is now about to start an investigation of further M-sections, based on the results obtained with the first series, and directing the further development in more intimate touch with practical needs than he had while associated with a pure research organization The Alexander Aircraft Company have made appropriations for a wind tunnel to assist in the improvement of their products, and it has been decided to study all questions, whenever it seems promising, in systematic flight work The author hopes to be able in a near future to lay before the readers results with more, better and up to date M sections, adapted to the last needs of the designer, and obtained in wind tunnel and in actual flight work

Appendix

For the convenience of the reader the relations discussed in the preceding articles are repeated in equation form

Let the chord extend from $x = -1$ to $x = 1$, this latter point being the trailing edge, and let ξ denote the ordinates of the median curve

	Equation	Angle of Camber	Angle of Chord	
Parabola	$P = 1 - x^2$	1	0	Max = 1
S-Curve.	$S = (x^2 - 1)\,x$	$-\frac{1}{2}$	$\frac{1}{2}$	Center inclination = 1
Thickness curve	$T = (1 - x)\sqrt{1 + x}$	0	0	Max = ± .5443 at $x = -\frac{1}{3}$

Thickness I = 055 T, Thickness II = 0.073 T, Thickness III = 0.11 T, $a = 0.1\,(S + \frac{2}{3}P)$, $b = 0.1\,(S + P)$ Camber integral

Camber integral $$\alpha = \frac{1}{\pi}\int_{-1}^{+1} \frac{\xi\,dx}{(1 + x)\sqrt{1 - x^2}}$$

Moment integral $$\alpha = -\frac{2}{\pi}\int_{-1}^{+1} \frac{\xi\,x\,dx}{\sqrt{1 - x^2}}$$

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THE IMPORTANT MATTER OF Confidence AND THE AIR PASSENGER

Some Straight-From-the-Shoulder Criticism of the Highly Unprofitable Methods of Handling Passengers Now Being Followed by Some Transport Companies

By Lieut. Comdr. Frank W. Wead, U.S.N. (rtd.)

The future of air transportation in the United States depends entirely upon the amount of air passenger traffic that can be developed Freight, mail, express, sport flying, the various government branches of aviation, and private air traffic will always help to maintain an aeronautical industry Such activities have, however, done practically nothing toward developing the network of excellent airways that now covers Europe, and without doubt we will ultimately find that the same fact is true in our own country The air passenger, then, should be entitled to every consideration that can possibly be given to him The mere fact that airplanes travel fast is no longer sufficient The intelligent air passenger not only demands that he travel fast, but in addition, that he travel with convenience, with comfort and with safety.

After some years of active flying the writer of necessity drifted into other channels Many of my associates became average men and women to whom flying was only a dangerous, thrilling pastime indulged in by individuals that were slightly unbalanced Lindbergh flew to Paris; air transport came alive with a bang, other splendid flights more than overshadowed tragic failures, the public became interested People were sold on aviation They wanted to learn about it They wanted to fly and they did fly. I saw the start of the air transport game, not as a participant, but from a grandstand seat, and, more recently, as a customer. My friends constantly asked, and still do, my advice on aviation matters, questions on investments, types of planes, schools, transport lines, engines, and every other thing under the sun connected with flying Some twenty-odd of them took up instruction and all have a private license or better at this time Others wanted to use the airplane for travel, for business, or for pleasure Some of these latter have been well pleased with their experiences and travel by air at every opportunity Others have not been so fortunate.

Group Number One of these air passenger friends of mine took a very short trip over a scheduled airway that handles considerable traffic They got into their seats nicely and without delay, took off and climbed to 1500 feet Their nervousness died and they began to enjoy the trip While still some miles from their destination the pilot without warning cut his guns, shoved the nose down, and lost a thousand feet of altitude in a steep dive Then he opened his throttles and continued on his way His dive was unexpected The passengers had to brace themselves to avoid being thrown out of their seats and they thought that something was wrong with the plane or with the pilot They were frightened They were intelligent people of large earning capacity, but they knew nothing about aviation, and they were

on their first flight Perhaps the pilot only wanted to give them a thrill Perhaps he did not think of his passengers or was careless Such people don't want airplanes to thrill them any more That day has passed They want airplanes to take them some place The curiosity of these particular passengers about aviation suddenly died They tore up their return tickets and came back home by other means of transportation They were a little ashamed of the fact that they did not like to fly but they weren't having any more of it Properly handled they might have developed into enthusiastic boosters for air transport A lot of their friends were curious too—had planned trips by air But most of them had been talked out of it—one unnecessary dive did the work.

GROUP TWO were off for a week-end jaunt both ways by air They sent a messenger down to the office of the air line to make reservations He paid the charges and returned with reservation slips The following day at the airport one of the party approached the man in charge and handed him the slips Results The slips had to be taken to the ticket window and exchanged for tickets Each member of the party had to personally confer with the ticket agent and give him full information as to age race address of all relatives bank balance and previous condition of servitude In return he or she received a ticket several yards long for a hop without intermediate stops of about one hundred miles! The plane waited for them while they one by one accomplished this vital piece of business The plane was 15 min late shoving off On the return trip at the other terminal of the line they waited 55 min for an overdue plane to arrive No information was available as to when it might get in There was a small shed for passengers but nothing to sit on They were tired but they didn't like to sit on a freshly oiled flying field From a standpoint of flying equipment and competent pilots this particular airline, to my mind, leaves little to be desired They are however neglecting the thing that is most vital to them Fine planes and pilots are of little value if they travel empty Some information regarding passengers should perhaps be recorded It should be kept at a minimum and handled expeditiously When people travel to save time they should not be required to waste it buying tickets or waiting for airplanes

GROUP TWO were off for a week-end jaunt both office of an airline and were assigned seats in plane number say 17 for a half-hour exhibition flight over the city They were assured that there would be no delay at the airport Some of them had important engagements—others were on their lunch hour At the airport they saw plane number 17 make four fully loaded trips before they finally got on board after a three hour wait (if they sat down they lost their place in line) and finally several plane loads of people who arrived at the airport after they did went off in other planes before they finally thrust their weary selves upon the pilot of number 17 Of course that day was an exception A crowd was to be expected If, however, airlines which conduct sight-seeing tours want crowds they should provide methods for smoothly handling them, and they should coordinate their downtown and field offices.

GROUP TWO were off for a week-end jaunt both, the first time in a three-engine 8-place cabin job on a regular commercial airway The commercial pilot was unknown to them and they had flown the route hundreds of times themselves. Perhaps they were a little critical The pilot kept off the air line, which is well dotted with good fields in order to fly a slightly circuitous route along the ridge of a small mountain range where practically nothing but a parachute could land The attendants at the point of embarkation had laughingly told them that the pilot had cracked up a couple of planes the week before which made them feel particularly kindly toward him The seats of the cabin job seemed to be merely tacked to the floor of the cabin One pilot kicked the empty seat in front of him and broke it loose from its moorings He didn't kick very hard either There were no safety belts tied to the cabin structure so that the passengers were sure to slide into a tumbled mass in the forward end of the cabin in case of a crash Two passengers were air-sick, but the windows were so tightly jammed that they could not be opened The air got pretty foul and then two other passengers got air-sick, too The pilot made no effort to climb above the bumpy air He cruised along at two thousand feet and every time the plane would hit a very bad bump he would turn around and grin at the passengers, reassuringly

It didn't seem to work very well One woman said that she wished he'd pay attention to what he was supposed to be doing and one of the passenger pilots said that he looked pretty nervous himself and that his grin was rather forced The other suggested that it would be great if the company would hire somebody to care for air sick passengers and do the pilot's grinning for him The passenger seats were very straight-backed wicker chairs with thin leather cushions After fifteen minutes or so they were rather uncomfortable and after an hour in rough air they were torture The pilot and assistant pilot didn't seem to mind this they each had a big fat air cushion to sit on The pilot finally got down safely at his destination The following day the two passenger-pilots were out at the airport when the same pilot took off in a similar 3-engined ship with eight passengers in it The center engine was cutting out as he revved it up for test at the end of the runway He took off and just at the end of the field the center engine quit cold He landed in a dry river bed and crashed to a complete wreck By a miracle no one was killed but the flying yen of some of his passengers was undoubtedly permanently satisfied

On one occasion I went with two friends to an airport where a nation-wide flying service conducts sightseeing tours The hangar looked rather sloppy several hundred dollars' worth of new gear was kicking around a dirt floor and the manager was busily supervising the painting of a plane to his own fancy We finally caught the eye of one of the pilots Sure, we could fly but not with him Why? Well I'm not flying any blankety-blanked OXX 'Sparrow' out of this field with two passengers in it This pilot and his employers apparently differed regarding the suitability of their equipment, a matter that to say the least should be settled in private and not before prospective customers

The airport in question is not large and the flying service in question operates OXX "Sparrows" The airport is close-in to the business district and is one of the most ideal in the country for the purpose for which it is intended—an air transport terminal While we were talking an OXX "Sparrow" landed came to a complete stop and then took off again without taxi-ing back The pilot cleared the trees at the end of the field by 50 to 75 ft

Another airport was just ahead of him in case of a forced landing. It looked very safe to me Two weeks later I again visited the airport The pilot who wouldn't fly "Sparrows" was still working for the same firm, and I didn't see him fly a plane of that type The manager of this branch is not a pilot and knows little about flying a fact that speaks for itself regarding this occurrence

A SEVERE CRASH recently occurred on one of the air transport lines Perhaps nothing in aviation has excited more comment among the embryonic pilots, and flying and non flying people I know They were sorry about the crash but they realize that air transport has its dangers, as does every form of transportation and most of them have wholeheartedly accepted it despite those dangers Their comment was directed primarily at the fact that the line suspended operations for a period of time after the crash They granted that search for the lost plane was necessary, but it seemed very unbusiness-like to them not to continue operations weather permitting, and, if necessary ride their own personnel over the route to capacity to show that they had every confidence in it.

Stopping operations seemed to indicate that something was wrong with the equipment or methods that needed time for readjustment To others the move seemed to be semi-sentimental designed to catch the sympathy of the public as cessation of operations naturally entailed loss of revenue for the line These opinions are not personal, I merely record impressions Anyone who deals with aircraft necessarily takes some risk with human life Air transport is a business and should be run as such.

IT WOULD SEEM that much of the above deals with minor details If true, each detail bears directly upon the passenger who travels by air and it is therefore worthy of thought If minor, correction should be easy.

It is suggested that placards in the cabins of passenger planes would be of interest to passengers One such card should give the history of the pilot in an interesting way provided, of course that he has a history Another might well give facts about the plane A third might briefly and simply describe the method of taking off, cruising, and landing A fourth could describe the route, pointing out prominent landmarks Another could give statistics on the past operations of the air line—miles hours, etc Another should state that the plane was inspected prior to flight and give some details of the inspection Some method should be devised whereby the passenger at a glance will recognize that he is entering a plane of superior type, maintained in the best possible condition Such cards would inspire confidence by giving the green passenger knowledge that he is interested in, is, indeed, eager to get They would distract his attention and lessen his fear We worry less about things that we know a little about In addition, the assistant pilot or steward (on some lines called courier) might have several cards covering a few simple occurrences out of the ordinary such as passing through clouds, rain trouble with one engine and similar matters to be displayed should such conditions arise

Flying being what it is, the question of pilots will ever be vital Air transport is new, and many of the details are yet to be satisfactorily worked out There are undoubtedly a number of pilots now flying on air transport routes that will not hold their jobs when the present dearth is overcome Of course many of the finest pilots in the country are so engaged Good pilots develop and acquire experience much more rapidly than has heretofore been possible It is difficult to criticise a pilot of recognized ability in case of an accident No other person on earth can say just how he might have acted under the same momentary conditions and no one can exactly picture just what those conditions were It is certain however, that air transport operations must be directed by capable executives who are also widely experienced pilots whose decisions are beyond question The personal element in flying is so predominant that it appears that some system in which each pilot has a cooperative interest in the successful operation of the line would be worthy of trial At present some lines are operating with cheap equipment and poorly paid pilots in direct competition with companies that are trying to do the job in the best possible way Higher standards must prevail, and means for enforcing them provided by the air transport operators or externally, if air transport is to continue to grow

WEATHER as always is a problem Imperial Airways planes on the Paris-London route are always in touch with Croydon by radio phone They receive up-to-the-minute weather reports They can be located by radio bearings on short notice Near our coasts ship radio bearings stations exist which might be utilized for aircraft. Along the inland airways radio stations would have to be supplied at terminals, and at intervals some distance off the air line in order to obtain a satisfactory intersecting angle for the two lines of position The initial expense and the cost of operation of such a system would be considerable but not prohibitive The time to provide equipment and develop methods of operation that are as nearly accident-proof as possible cannot be further delayed Constant radio-phone service to every air-transport plane in flight is a vital step.

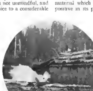
A number of air transport operators seem to feel that profits cannot be made until planes carrying fifty passengers or more are in use and passenger traffic provided considerably greater in volume than that now available The initial and operating cost per passenger seat can be greatly reduced with larger planes and the revenue per passenger seat can be reduced and still show more profit than in smaller types provided capacity or near capacity loads can be regularly hauled The air line that right now cannot reduce its overhead and increase the regularity of its loads to a point where profits are in sight is probably soon due to go. The public is about saturated with air securities and the flush or air enthusiasm will no longer carry the financial burden of consistent loss.

The average man has been sold on flying as a stunt but he is not yet whole-heartedly convinced that it is really here to stay National advertising setting forth the advantages of air travel financed by the airline operators as a group, is badly needed It would be interesting to know how many of the passengers on any air transport line fly for business reasons and how many fly as a stunt or for pleasure. It would be even more interesting to know how many passengers make one trip and then return to normal means of transportation Every time this latter occurs air transport has failed to make a sale Air travel must be developed into a national habit One means of furthering this appears to be in making each trip an unqualified pleasure for the air passenger He should be treated not as a casual customer but as a paying honored guest

SPECIALIZING THE PRODUCTION OF *Wooden* Parts

By John F. Hardecker

ENTIRELY beyond the range of the intrinsic merits of the two competing materials, wood has had to overcome the added handicap of its own industry's lethargy toward the airplane industry—a condition of which the airplane manufacturer was not unmindful, and which of necessity influenced his choice to a considerable degree. In contrast, the metal industry has been keenly air-conscious, the airplane being literally the testing laboratory for many of the new metal alloys developed in recent years. In fact, in past years, when the volume of material used by the aircraft industry itself was an almost negligible minimum, metal manufacturers have worked unceasingly in developing and perfecting new alloys for airplane use, realizing that if the new alloy successfully met the rigid requirements of aeronautical usage, the desired volume of business could be readily obtained in other industries once merit had been so established.



The log dump. Spruce logs are sorted in this pond for the mill

As the airplane manufacturer continues to make his decisions, wood, the pioneer material, has been steadily losing ground to metal, particularly the new light alloys. Some of this loss has been logical and inevitable, for as the aircraft industry expanded to its present astounding proportions it was reasonable and proper that specialized usage should extend the range of raw materials found desirable for particular functions and manufacturing processes. However, that part of the loss which may be charged to the aircraft designer's desire to utilize a material which was of high strength weight ratio and positive in its physical properties within narrow limits, is due primarily to the lumber industry's own failure to recognize the particular needs of the aircraft industry.

While the metal industry made a close co-operative study of aeronautical requirements, and modified its own trade practices in so far as its contacts with aeronautical activity were concerned, the lumber industry as a whole was prone to stand pat on its current commercial practices and gradings, and put the burden of proper aeronautical application of its material on the airplane manufacturer himself. The inevitable consequence was that the airplane manufacturer to some extent lost faith in wood as a raw material, and looked to the far more co-operative metal industry more and more as the source of his raw material. This shifting of the burden of proper wood segregation from the supplier to the consumer was the primary error of the lumber industry, for it virtually demanded that the airplane manufacturer become more expert in wood classification than the lumberman himself, if he were to avoid the dire consequences of careless and indifferent grading.

The airplane manufacturer encounters no greater problem in all his work than that centering about his initial choice of basic raw materials. While details of design may often be refined in materials other than the original ones, the initial choice between metal and wood is irrevocably built into the design. The many ramifications of this age old struggle between the outstanding manufactured material and the leading natural material is really beyond the scope of this article, which is concerned primarily in presenting to the airplane manufacturer the means whereby he can assure himself of the most practical and consistent availability of the natural material—wood—in a form best suited for aircraft construction purposes.

Transporting spruce logs to the logging road

THAT this indifference toward the particular needs of the airplane trade has been at the bottom of the trend away from wood, is forcibly illustrated by the remarkable success of the Posey Manufacturing Company of Hoquiam, Washington, which functions as specialized manufacturer of airplane spruce products for the aircraft industry. The specialized metal manufacturer has been a very significant factor in aeronautical development almost from the beginning, and through the gradual expansion of this activity, and the continued entrance of new metal specialists in aeronautical activity, the mass production airplane is an attained actuality in aviation today. This realization of true quantity production in airplane fabrication is perhaps the most outstanding accomplishment of the current aeronautical phase of development.

That the success of the specialist in airplane fabrication is not confined to the metal trades, is amply indicated by this organization, which for over 25 years has been functioning as specialized manufacturer for the piano industry, in supplying piano manufacturers in this and foreign countries with finished spruce piano parts. These piano parts have been kiln dried and machined to neat sizes in the white. This was proven to be economically sound inasmuch as all waste was eliminated at the source of the raw material and freight had only to be paid on the finished product.

Finishing spars after the kiln drying

The success of these principles natucally lead to an attempt to do the same thing for the airplane manufacturers who were buying their material in the rough and accumulating an enormous quantity of spruce lumber in their yards because such a small percentage really passed for airplane spar stock. Even the best and most intelligent wood experts are unable to grade lumber in the rough close enough to make it economical to ship over long distances at the high freight rates prevailing, since there is too much waste at the delivered end.

Therefore the wood specialty manufacturer has been able to build up a rapidly increasing demand for finished airplane spars manufactured at the source of the raw material. The many other spruce products made at the specialty plant furnish other channels for the disposition of the material which falls below the strict airplane grades, so that it is possible to credit the airplane stock for this fall-down, which otherwise might be practically worthless.

Under such conditions of specialized wood manufacture, operations go back to the logging of spruce trees, the sawmill operation where spruce logs are cut into lumber, the kiln drying according

to aeronautical specifications and finally to the finished airplane part. Such an organization, possessing as it does the facilities for all kinds of wood working operations as well as the latest designs of thermostatically controlled kilns, can get out all the wood products used in airplane manufacture. These products may include ribs or rib material, leading edges or the material for them, and built up laminated spars, or spars routed out of one piece according to specification.

Consequently, for the forgoing reasons, it is possible for example to supply the finished spars in the airplane or in place, so to speak, at a lesser cost than could be

A load of spruce ready for kiln drying

realized by other methods that have been used by airplane manufacturers to obtain their supply. First cost is high, but the cost in place is less as has been proven by the large successful airplane manufacturers who have an accurate cost-finding system in their plants.

Spruce so produced by this concern specializing in aircraft grades, has played a leading rôle in record breaking aeronautical performances. In Lindbergh's transoceanic flight, the Dole Derby, the endurance flight of the St. Louis Robin and the Angeleno, Schlee and Brock's achievement, Robbins and Kelly in their splendid performance and to many others, this specialized spruce has contributed its part. In the Waco and Travel-Air planes winners of the reliability tours, and in many other spectacular flights which have tested the mettle of planes as well as pilots, these specialty manufactured spruce spars have repeatedly proven their reliability.

There are many savings that the airplane manufacturer may make by turning his wood-working operations over to specialists. In the first place he greatly increases the flexibility of his own production schedules, since the specialty manufacturer is in a far better position to maintain a large force of expert workmen by virtue of the diversity of his production, and it is these workmen who are immediately available for rush orders and increased demands from the aircraft industry. At the same time possibilities of delays due to delivery of poor material are obviated. It has not been unusual for an entire shipment of so-called "aircraft spruce" to be rejected at the plant of the aircraft manufacturer.

In addition to the saving of freight charges on the far lesser bulk of finished parts, the airplane manufacturer automatically finds an outlet for wood which is not of aircraft grade, and which would often be a dead loss in his own plant. A great economy can be effected by the airplane manufacturer through the use of these specialized manufactured wooden parts, through keeping down inventory, interest, taxes, insurance and storage space. The temptation to use lumber which is slightly below grade, merely because it is the only available material which can be used without production tie-ups, is automatically removed from the airplane manufacturer's range of vision. Finally, in his ultimate decision as to basic material, the airplane manufacturer is free to weigh wood in terms of its maximum possibilities without mental reservations as to how far it might fall below specification grade in reality.

The lumber industry, or at least that part of it desirous of aeronautical business, can learn a valuable lesson from the experience of the successful wood specialty manufacturer. Only by an intimate and particular study of aeronautical needs, and a sincere effort to meet those requirements, can the lumber industry hope to hold its own in the competition between metal and wood in the aeronautical industry. The production of wooden parts should be specialized to a reasonable extent consistent with the specialization in the production of parts made of materials other than wood for airplane construction.

An early process in the building of an airplane. Sawing a good spruce log into flitches

GENERAL NEWS

Herbert F. Powell, *News Editor*

HIGH POINTS in the NEWS

▶ *Qualifies* Tanager, Curtiss Aeroplane & Motor Co entry in Guggenheim Safe Aircraft Competition completes eighteen preliminary tests bringing $10 000 prize and plane is now eligible to compete for grand award of $100 000 Handley Page only remaining entry, has finished fourteen tests

▶ *Export statistics reported* October 1929: 25 airplanes 20 engines $159 029 in parts and accessories November, 1929: 34 airplanes 14 engines $242 575 in parts and accessories

▶ *Chair granted* Dr A H Zahm since 1916 director of the aeronautics laboratory of the Navy named to Guggenheim Chair of Aeronautics at Library of Congress

▶ *Also* Frederick R Neely becomes chief of the Aeronautics Information Division Fisk Marshall becomes head of the Licensing Division

Airports and Airlines

▶ *Young reports '29 progress* Several "mores": 5 325,000 more miles of scheduled flying 36 000 more passengers 4 000 000 more pounds of air mail carried and 19 000 more miles of airways Exports in first six months exceeded '28 total by 41 per cent Aircraft production put at 6 000

▶ *Less postage* Mail sent from this country to the Canal Zone and vice versa, goes for $.20 for each half ounce or fraction Other reductions to South and Central American countries

▶ *Days to be saved* P A A plans one-day Miami-Cristobal service to take place of present indirect three-day route Project use of four-Hornet 41-passenger Sikorsky amphibions

Foreign

▶ *Pleasing to private owners,* London Air Park, Hanworth, Eng, now provides maintenance service on Moths—covering routine inspection minor adjustments cleaning and regular check on fuel and lubricants—for $4.86 per week

▶ *Antipodes will try it.* Commonwealth Railway Department and Australian Aerial Services co-operate to offer 35-hr transcontinental air-rail service between Sydney and Perth, Australia

Plan Hoffman Chute Production

CINCINNATI (OHIO) — Triangular parachutes will be manufactured by the Triangle Parachute Co, to be established in Norwood, Ohio according to Lee G Schlegel, superintendent of the plant The chute is that developed by Maj E L Hoffman who is with the Army Air Corps at Dayton Also of triangular type, a plane chute has been developed by Major Hoffman designed to bring disabled planes safely to the ground

Approve Four More Planes

WASHINGTON (D C.)—Four more planes have been added to the approved type certificate list Rated according to certificate number, make and designation type power plant, weight empty, useful load, and gross weight they are No. 280—Travel Air 4-P three-place open biplane, Ace LA-1, 140 hp 1,331 lb 857 lb 2 388 lb, No 281—Fokker F 32 32 place closed monoplane, 4 Hornets 14 206 lb 8 294 lb, 22 500 lb No 282—American Eagle Phaeton R-540, three-place open biplane Wright J6-5 1,759 lb. 801 lb., 2 560 lb No 283—American Eagle Phaeton J5, three-place open biplane, Wright J5, 1 896 lb, 907 lb, 2,803 lb

Genealogy Of "Aviation"

AVIATION was founded by Lester D. Gardner, the first issue appearing Aug. 1, 1916, as *Aviation and Aeronautical Engineering*. In 1920 the *Aircraft Journal* was absorbed and the title became *Aviation and Aircraft Journal*, to be simplified into AVIATION in January, 1922. The chief editors have been Ladislas d'Orcy, W. Lawrance Le Page, Earl D. Osborn, R. Sidney Bowen, Jr., and Edward P. Warner

The present staff consists of Edward P. Warner, editor, R. Sidney Bowen, Jr, associate editor; Herbert F. Powell, news editor; Leslie E. Neville, technical editor; Earl D. Osborn, contributing editor; Charles F McReynolds, Pacific Coast editor; John T. Nevill, Detroit, editor; Charles H. Gale, David J. Leisk, Charles E. Noyes and Deane Davenport assistant editors.

Tanager Qualifies In Safe Craft Trials

Wins $10,000 Prize; H P Has Passed 14 of 18

MITCHEL FIELD (L I N Y)—Completion by the Curtiss "Tanager" of the eighteen qualifying tests in the Guggenheim Safe Aircraft Competition is announced here This qualification wins one of the secondary prizes of $10 000 for the Curtiss Aeroplane & Motor Co and makes the craft eligible to compete for the grand award of $100 000

If no other plane entered in the Competition completes these preliminary tests trials for the major prize will not be necessary The Handley Page, only remaining entry at the Field has finished fourteen of the eighteen tests It will undergo the final four when weather permits

Though no public announcements have been made, it is understood that J S McDonnell, Jr, and associates are still planning to bring their low-wing monoplane to Mitchel Field for trials, even though the craft was not returned by Dec 23 as stipulated in the allowance granting extra time for the repair of the plane The McDonnell entry was damaged in a preliminary flight prior to presentation to Fund pilots in November

No report, furthermore, is forthcoming concerning the V J Burnelli entry Competition officials, it will be recalled, announced last week that the Burnelli craft might yet compete for one of the $10 000 prizes provided tests conducted by the owners justified such action.

Koehl and von Opel Here

NEW YORK (N Y) — Germany's aeronautical notables are arriving in this country regularly Last week's visitors included Capt Herman Koehl, who flew East-West across the Atlantic in company with Maj J G Fitzmaurice, who also is now in the United States, and Baron von Huenefeld, and Fritz von Opel, German automobile manufacturer and authority on rocket planes Their wives accompanied them

Arrow Adds Welding Shop

HAVELOCK (NEB) — An experimental welding department has been established here by Arrow Aircraft & Motors Corp builder of the Arrow Sport planes Pete Engel, formerly with Fleetcraft Airplane Co, Lincoln Neb, is in charge The Arrow firm reports production of two planes a week

Neely, Marshall Get Aero Branch Positions

WASHINGTON (D C)—The appointment of Frederick R. Neely to the position of chief of the Aeronautics Information Division of the Department of Commerce, has been announced and it is stated that he will assume office on Jan 1. The appointment of Mr. Neely is to fill the position vacated by the elevation of Harry H. Blee to the post of Director of Aeronautic Development—part of the two-way split-up of Major Young's former office of Director of Aeronautics.

Mr Neely has acted as general manager of the National Aeronautic Association with offices in Washington and he was formerly aviation editor of the Washington *Star*. His new position at the Commerce Department will place him in charge of the editorial service, the aeronautics reference library, the airways bulletin, and the statistical reports. In the performance of his duties, he will report to Mr. Blee.

It has also been announced that Fisk Marshall, formerly with the Midwest Airways Corp, will become the new head of the Licensing Division, taking the place of Maj Edward P Howard who has resigned. As chief of the Licensing Division, Mr Marshall will have charge of the Engineering, Medical, and Legal sections. He will be under G G Budwig, the Director of Air Regulation, who together with Mr Blee is filling the position formerly occupied by Major Young as Director of Aeronautics.

Union Offers Service Plane Oils

LOS ANGELES (CALIF)—Union Oil Co has placed on the market new oils especially developed for use on army and navy planes, states W. L. Standard, sales manager. Distribution centers for the products are located at points between Vancouver and Mexico.

Open Curtiss-Wright Warehouse

ST LOUIS (MO)—The new Mid-Western warehouse here of Curtiss-Wright Flying Service has started operations, a report states. Stocked with 10,000 standard airplane parts, it is in charge of John N. Krieger, formerly with the company in New York.

Consolidated Aircraft Plans Virginia Branch

RICHMOND (VA)—The Consolidated Aircraft Co, of Buffalo, N. Y., is considering the Virginia Peninsula as a site for a southern branch. The company has leased from the Navy Department half of the seaplane hangar at Langley Field until June 30 1930, for the assembly and storage of aircraft. Twelve planes are to be assembled for the New York-Rio & Buenos Aires Line.

An assembly crew of eighteen from the Buffalo factory has been sent to Langley Field. George Newman, vice-president of the company, is in charge of the work. The flying boats are to be of the Consolidated "Commodore" type. They will carry two Pratt & Whitney Hornet engines.

While the planes are being assembled, officers of the company will survey the Peninsula with the view to finding a site close to water. A study of labor conditions also will be made. The completed planes will be tested in flight by William Wheatly, of Buffalo.

Shell Firm in Aero Expansion

SAN FRANCISCO (CALIF)—Shell Oil Co., this city, has confirmed a report that it will undertake a special program of aeronautical development. Lieut. John A. MacReady, former Army Air Corps altitude flier and member of the first non-stop transcontinental flight crew, will become associated with Shell Jan 1 to take charge of the work.

Slate Airship Tests Postponed Indefinitely

LOS ANGELES (CALIF) — Trial flights of the Slate all-metal airship "City of Glendale" have been postponed indefinitely due to damages sustained by the metal envelope of the dirigible when a trial flight was attempted recently. The dirigible was moved out into position for a takeoff with all engines running, but the warm sun expanded the gas within the bags so quickly after removal of the dirigible from its hangar that, when the safety valve stuck, a seam burst near the top of the shell permitting a considerable quantity of gas to escape. The dirigible was returned to its hangar at once, no further damages being sustained. Repair of the injured portion of the skin is now being undertaken.

The "City of Glendale" is now powered with a Hallett seven-cylinder air-cooled radial engine mounted on the nose of the bag and operating a centrifugal blower, and a Hispano-Suiza engine at the rear of the passenger cabin operating a conventional air screw. A small four cylinder engine is also mounted outside the cabin, having been converted into an air driven air compressor for supplying pressure needed to operate various auxiliaries.

Detroit Aircraft Corp. Forms Export Division

DETROIT (MICH)—According to an announcement made by E S Evans, president of the Detroit Aircraft Corp., there has just been formed the Detroit Aircraft Export Corporation Division. This new branch will handle sales in South and Central America, China, Japan, Australia, New Zealand, and South Africa.

I J Miranda, who has had many years' experience in the export field and now has an organized force of resident field men in Mexico City, Costa Rico, Venezuela, Brazil, Argentina, Australia and South Africa, is vice-president and general manager.

In addition to key men in each of the above places, Mr. Miranda has 82 subdealers; the field manager of Japan has six subdealers; the one in New Zealand has three subdealers; there is one each in Sidney, Australia, Johannesburg, South Africa, and Mukden, Manchuria. The other officers of the new company will be the same as those of the Detroit Aircraft Corp.

Condor Convertible for War

WASHINGTON (D. C) — In casting about for a commercial plane that can readily be converted into a military plane, the Army Air Corps has selected the Curtiss Condor as a promising type. The Curtiss Condor, it has been found can be converted into a B2 bomber with only a few alterations.

New York Police Get Keystone-Loening and Savoia

IN THE PHOTOGRAPH ABOVE Grover Whalen, New York Commissioner of Police, is shown at the recent ceremony in which he formally accepted the Keystone-Loening and Savoia-Marchetti amphibions, first craft to become an official part of the police organization. The two planes were donated by Rodman Wanamaker. In front of the squad of police fliers, left to right, are Arthur Chamberlain, in charge of police aviation, Rodman Wanamaker, Commissioner Whalen, Chief Inspector O'Brien, and Inspector Harry Lobdell.

Production Begun On T-M Army Planes

BUFFALO (N Y)—Production has begun in Buffalo on the order for 71 combination combat and observation planes contracted by the United States Army from the Thomas-Morse firm of Ithaca. Thomas-Morse was recently merged with the Consolidated Aircraft Corp., of Buffalo makers of the Commodore, Fleet, and Fleetster planes and was moved to Buffalo. It has been established in a huge addition to the Consolidated plant on Elmwood Avenue comprising 70,000 sq ft of floor space and is now in full operation.

Ray P. Whitman, of Consolidated states that the Thomas-Morse all metal plane is expected to be one of their most popular manufactures. The planes in production are designated as the O 19 B. They are two-seat observation planes with defense guns in the first cockpit and completely equipped with radio and cameras in the rear cockpit. The planes are biplanes with the conventional braced fuselage extending to the rear cockpit, while from there back the construction is monocoque. The wings of the plane are of duraluminum construction with specially designed spars and all-metal ailerons and are fabric covered. The tail services are also all-metal.

Three of the planes are nearing completion now and will be delivered within the next two weeks. Production of planes and parts will be speeded up this month, and it is expected that the entire order will be completed by June 1 at the rate of 20 planes per month for April and May. B D Thomas is in charge of the Thomas-Morse unit of Consolidated and Ray Ware is second in command.

W.A.E. Engine Service Efficient

LOS ANGELES (CALIF)—A new engine service policy instituted by C C Cole, superintendent of operations for Western Air Express, has resulted in noteworthy mechanical efficiency of engines on W A E planes. The new plan assigns each engine for its entire useful life to one mechanic only and that man is thereafter responsible at all times for the condition of the engine. This puts all engine maintenance on a personal basis, each man as a matter of pride making every effort to keep the plant under his care on a par with those of other mechanics. Three overhauls are given every engine during the first 400 hr of its life, the first at 12 hr being a routine inspection, the second after 24 hr in the air consisting of pulling the connecting rods, taking the magneto apart, checking the valves and examining minutely every working part, and the third overhaul at the end of 400 hr an exhaustive one, each of the engine parts being thoroughly inspected and tested. This consumes approximately 100 man hours, or one hour of a mechanic's time for every four hours that the engine is flown.

N.-B. Branch Profits Reported

ST LOUIS (MO)—A gross profit of $2 552 37 was made by the Los Angeles branch of the Nicholas-Beazley Airplane Co Inc of Marshall, Mo, during November, officials have announced. The branch carrying only aeronautical parts and supplies carried by the Missouri owners, has been in operation three months.

Report November Plane, Engine Exports

WASHINGTON (D C)—Exports of airplanes, seaplanes and other aircraft for November 1929 showed a large increase over the previous November a preliminary report shows. Thirty-four planes were exported at a value of $367 709 as compared to eight planes valued at $76 385 in November 1928. The eleven-month period ending November 1929 showed exports of 329 planes with a value of $5 099 069. During the corresponding period ending in November of the previous year only 148 planes valued at $1 604 210 had been exported.

Engines for aircraft suffered a decline in exports in comparing the two Novembers. The rise in engine costs is reflected in the fact that while 30 engines with a valuation of $80 671 were exported in November 1928 the fourteen engines exported in November 1929, were valued at $76 839. One hundred sixty-two engines were exported during the eleven month period ending November 1928, as compared to 299 engines during the same period in 1929. Valuation of these engines rose from $571 934 to $1 298 037.

All aircraft parts and accessories except tires exported in November 1928, were valued at $50 420, while the succeeding November showed an export valuation of $242,575. The total for the eleven month period of 1928 was $1,139,902 as contrasted with a valuation of $2 038 119 for the same period of 1929.

Soviet Engineers Visit U. S.

NEW YORK (N Y)—P I Baranov, chairman of the Soviet Council of Civil Aviation, A. N. Tupolev, constructor of the plane "Land of the Soviets" which recently completed a flight from Moscow to New York, and several engineers of the Council of Civil Aviation, have just arrived in this country for a short visit according to an announcement of the Amtorg Trading Corp. The delegation will study the aviation industry and commercial airlines in the United States. The engineers accompanying Messrs Baranov and Tupolev are I A Feldman, Prof B C Stechkin N M Kharlamov and E Urmin.

Pacific Aero Changes Name

SEATTLE (WASH)—Pacific Aeromotive Corp, this city, has changed its name to Seattle Aeromotive Corp.

October Exports: 25 Airplanes, 20 Engines

WASHINGTON (D C)—The Bureau of Foreign and Domestic Commerce has released information concerning the export of airplanes, engines, and parts (exclusive of tires) to foreign countries during October, 1929. Twenty-five planes were shipped totalling $377 924 in value and twenty engines totalling $94 108.

Seven planes valued at a total of $82 717 were shipped to Canada while Netherlands, Salvador and Argentina got three a piece valued at $16 000, $27 840, and $118 700, respectively. Other countries receiving craft were Panama, one, $6 500; Mexico one, $11 500; Dominican Republic, one, $2 525; Ecuador two, $17 800; China, one, $29 885; Japan two, $39 560; Philippine Islands one, $24 897; and Porto Rico, one, $2 576.

A total of 20 engines were exported in October, five of these going to Panama and valued at $29,312. Power plants shipped to other lands were as follows: Canada, three for $1,445; British Honduras, one for $3 919; Mexico, two for $4 625; Argentina, one for $5 662; Brazil, one for $1 449; Chile, one for $5 862; China, three for $21-000; Philippine Islands, two for $12,683; and New Zealand one for $8,151.

Parts Reach $159,029 Value

Export of parts during October totalled $159 029 in value, Canada being the leading importer with the reception of $73,193 worth. Other leaders were United Kingdom, with $10 340; Argentina, with $8 300; Japan, $8,255; Italy, $7 625, and China, $7,461.

The remaining shipments were as follows: Belgium $1 555, Czechoslovakia $190, Germany $2 186, Netherlands $5,-089, Poland and Danzig $6 790, Sweden $1 350, Switzerland $15, Honduras $619, Panama $4,212, Mexico $5,017, Trinidad and Tobago $233, Other British West Indies $1 070, Cuba $4 121, Dominican Republic $95, French West Indies $300, Republic of Haiti $43, Virgin Islands $1 003, Brazil $1 263, Chile $3 070, Ecuador $1 030, British Guiana $49, Surinam $655, Peru $3 665, Philippine Islands $35, and Australia $200.

Byrd Now Rear-Admiral

WASHINGTON (D C)—Making him the youngest officer of his rank in the United States Navy, Comdr. Richard E Byrd last week was honored by Congress for his Polar explorations by promotion to the grade of Rear-Admiral. The new Rear-Admiral is 41, and "jumped" the rank of Captain entirely in his promotion as did his predecessor, Admiral Perry, who was likewise honored for his discovery of the North Pole. Late news reports state that Admiral Byrd plans to ask Congress to promote his fifteen Naval assistants who have accompanied him on the present expedition.

New General Firm Under Organization

Continue Work on Old Orders at Buffalo Plant

BUFFALO (N. Y.)—Title to the old General Airplanes Corp of Buffalo, manufacturer of the Aristocrat and G.A.C. Mail plane, has passed into the hands of Harry Paltrowitz, New York business man Purchase of the bankrupt concern was recently completed with the presentation of a check for $45 000 to William E Robertson, bankruptcy referee, in his Buffalo office

On clinching the purchase of the auctioned concern, Mr Paltrowitz announced the formation of a new corporation which is expected to include several additional New York financiers and which is expected to annex several other mentorious aviation companies in the plane and engine field. The whole will be merged into a new General Airplanes Corp of New York.

Small Force Now at Work

A temporary corporation, formed after the initial purchase of the company several weeks ago, is operating the Buffalo plant on a skeleton force, completing craft that were in the course of construction and filling old orders. Officers of this temporary corporation are Fred R Shores, president of the Richmond Holding Corp and vice-president of the Industrial Plants Corp, president, D Falk Block, secretary-treasurer of the Marine Metal and Supply Co, vice-president, and Harry Paltrowitz president of the Marvin ville Gas Co president of the Marine Metal and Supply Co, and owner of the Clyde-dale Motor Truck Co secretary treasurer. Herbert C Kraft, of New York is also associated with the temporary firm as a director, it was stated. J W Bishop, former war pilot is the representative of the New York syndicate in Buffalo and is in charge of operations for the new owners

Endeavor to Retain Key Men

It was suggested by Mr Paltrowitz that Clarence Chamberlin may become associated with the new General Airplanes Corp. Mr Chamberlin recently visited in Buffalo with an associate, inspecting the plant at 618 Northumberland Avenue On several trips to Buffalo in the past Mr Chamberlin flew an Aristocrat plane and was reported enthusiastic over its performance The Aristocrat plane built for Rear-Admiral Byrd was inspected and tested by Mr Chamberlin on its acceptance

Mr Paltrowitz stated that the new firm contemplates retaining the old factory site of the General Airplanes Corp in Buffalo He said that steps are being taken to retain the key men of the old organization and that production will continue on old orders now and work will begin on new orders for planes after the first of the year

Lambert to Offer New Aero Engine

MOLINE (ILL.)—A lighter and cheaper airplane engine has been developed by Sam Lambert, president of the Lambert Aircraft Engine Corp, subsidiary of the Allied Aviation Industries Inc, and 25 demonstration models are now being made in the Moline plant with prospect that production will get under way in spring The new engine is expected to become the standard power unit for Mono Aircraft Corp which is also controlled by Allied Aviation Industries

The plant is similar in design to the five cylinder Velie radial but it is stated that a lighter material is used in the construction of the new power plant It is said that the engine has a lower specific weight than the Velie

Switlik Force to Meet at Show

TRENTON (N. J.)—Announcement is made here by H J Wolcher, sales manager of the Switlik Manufacturing Co, Floyd Smith Safety Chute division that the entire sales force will meet at the St. Louis show and give a group of exhibitions Lieut A H Mettee record-holding parachute jumper who recently became associated with the firm, has left on a demonstration trip into the South He will work down into Florida, then westward through the Gulf states, and finally north to St Louis

Plan Sales Expansion Through Auto Dealers

CLEVELAND (OHIO)—With a view of building up a national sales organization among automotive dealers, Great Lakes Aircraft Corp, and Lincoln Aircraft Co Lincoln, Neb, will display planes at the Cleveland Auto Show, Jan 25, it was announced by Herbert Buckman director of the annual display The two aircraft firms will display training planes

An alignment between the aircraft and automotive industries to distribute their products jointly is expected through display in the Auto Show The two groups are already linked through interests taken by automotive manufacturers in the production end of the aircraft industry

"The business of selling autos is becoming more and more competitive with the result that dealers realize they must adopt new lines to protect selling" D W Stratton sales manager of Great Lakes stated "Sales and distribution of planes is viewed by many auto dealers as a solution."

N. Y. U. Offers Ground School Teachers' Course

NEW YORK (N.Y.)—A special intensive course of eight weeks in the training of teachers for aviation ground schools will be offered beginning Feb 3 by New York University with the cooperation of the Daniel Guggenheim Fund Committee on Elementary and Secondary Aeronautical Education.

In giving this course the University continues its program for the training of teachers which was begun last summer but departs from its ordinary practice in concentrating the course in eight weeks instead of extending it over a whole semester in order to make it possible for flying schools to permit some of their personnel to attend

The Chief of the Aeronautics Branch has cooperated in arranging the subjects in the course which is designed to enable the student to pass the Department of Commerce examination for a ground school teacher's license, and will give practical preparation for the teaching of the subjects now required by the Department of Commerce for the curricula of ground schools

The courses are under the general supervision of Roland H Spaulding and the Daniel Guggenheim Fund Committee on Elementary and Secondary Aeronautical Education The teaching staff will consist of Victor Carbonara and J D Peace of the Pioneer Instrument Co, Frank M Granger, instructor in the Cass Technical School, Detroit Richard Whatham, meteorologist, U S Army Roger L Nowland, engineer at the Curtiss Aeroplane & Motor Co, and others not yet selected

The subjects to be taught include Airplanes Aircraft Instruments, Air Commerce Regulations Administration of Ground Schools Airplane Engines and Engine Instruments, Meteorology Air Navigation and Shop Practice in Airplane Rigging and Structure, and Airplane Motors

Suspend Four in Massachusetts

BOSTON (MASS.)—State Aircraft Inspector Robert L O'Brien has penalized four fliers of this state and suspended their flying licenses for violation of state aviation regulations Crocker Snow president of Skyways, was suspended for five days for landing in an unapproved field at Dover Mass, Nov 11 Robert A Wharton Jr was suspended indefinitely for violating the restrictions governing student fliers when he made a forced landing Dec 16 at Manchester He should not have left the vicinity of the Boston Airport according to O'Brien Charles M Treat was suspended indefinitely for starting a flight to New York without a proper check of weather reports though he made a safe landing at Brookfield Because he zoomed on a take-off at south Dartmouth, Dec 15, with two passengers aboard, nearly stalling his engine James E. Howarth of New Bedford was suspended for fifteen days.

Guggenheim Chair Of Aeronautics to Zahm

WASHINGTON (D. C.)—Dr Albert F Zahm has been appointed to the Guggenheim chair of aeronautics at the Library of Congress, established recently by the Daniel Guggenheim Fund For the past 13 yr Dr Zahm has directed the activities of the aerodynamic laboratory of the Navy

In commenting on his appointment Dr Zahm declared the Library should be "the foremost center for the dissemination of aerial information in this hemisphere, and also a center of research for all students and investigators who wish to do original work in aeronavigation"

Dr Zahm sponsored the first International Conference on Aerial Navigation during the Chicago World Fair He is the author of "The Resistance of Air at All Speeds Up to 1,000 Feet a Second" and is the inventor of the optical chronograph used in making measurements in speed and resistance tests One of Dr Zahm's most important contributions to the progress of aerodynamics was his development of the first air tunnel

During the war Dr Zahm was in charge of the scientific laboratory at the Curtiss factory He was also instrumental in preserving the Langley laboratory, and in its development into the present Langley Memorial Laboratory. In 1913 Dr Zahm assisted in sending the original Langley airplane to the Curtiss factory, where it subsequently was made to fly from water under its own power Dr Zahm was awarded the Laetare Medal by Notre Dame in 1925 for his services to science

D.A.C. Show Plans Announced

ST LOUIS (MO.)—Extensive plans are being made by the Detroit Aircraft Corp for its exhibits at the International Aircraft Exposition in St Louis in February "It is our intention to make this our largest showing of the year," said E S Evans president "We plan to show at least seven types of aircraft and two gliders. Exhibits will include the seven-place Lockheed Vega, Lockheed Sirius, two Ryans and Eastman Flying Boat, two of the Parks line, and possibly a small model of an all-metal dirigible We will also have large photographs showing development of our Grosse Ile airport as well as pictures of the Blackburn Flying Boat and the riveting machine manufactured by the Aviation Parts division Parks Air College division will also have a prominent place in the demonstration"

Hommel Does Aero Machining

OAKLAND (CALIF.)—The Leon Hommel Machine Works, here has established a department specializing in aeronautical machine work The plant is also manufacturing the Pantographic rotary wood slicing machine, Mr Hommel's invention

D.A.C. Gliders Now $435

DETROIT (MICH.)—Through reduced costs in manufacture since Gliders Inc was taken over by the Detroit Aircraft Corp the latter company announces a reduction of $150 has been made in gliders which formerly sold for $585 This makes the new price $435

Facts on Marketing Prepared by Bureau

WASHINGTON (D. C.)—Data contained in a handbook recently released by the Bureau of Foreign and Domestic Commerce, will prove of great value to aircraft firms and dealers, it is stated Called the "Market Data Handbook" it outlines suitable locations for distributors or manufacturers according to trading areas rather than by state boundaries

Some of the items in the handbook concern the general consumer market income producing activities, bank deposits, postal receipts trade outlets etc

This and other information in the book, will make it possible it is said, for distributors to be appointed with more care than has been possible up to now, and they will be enabled to plan their sales quotas efficiently Also the allocation of advertising and the outlining of sales territories will be made easier

Curtiss Gives Up Ireland Sales

NEW YORK (N. Y.)—The Ireland amphibion will henceforth be sold by its own sales organization and not by the Curtiss-Wright Flying Service as in the past, according to officials of the latter company in a recent announcement G Sumner Ireland, former head of the Ireland Aircraft Co recently joined the Curtiss Flying Service staff Ireland company headquarters will continue at Garden City under the direction of Bertram Work, president

Connecticut Develops Aviation Medical School

HARTFORD (CONN.)—Medical inspectors to supervise aviation personnel throughout the state are now being trained under the direction of the Department of Aeronautics and the Department of Personnel Inspection The state school of aviation medicine as previously announced has an elastic program due to its pioneer character, but now that it has been in operation for about three months, definite plans for the year are announced which will provide a complete course for the present group of students The state has been divided into sections, and there is one student from each After the completion of their training it is expected that they will be appointed as deputy medical inspectors for their districts.

Much of the teaching is done by correspondence, as arranged by the United States Army School of Aviation Medicine The school is in session 4 hr every three weeks, at which times lessons are reviewed and lectures given. Each student also receives half an hour of flight training every three weeks, and is given flight problems to illustrate different points in the course Before completing the work, each student will spend a resident period at Brooks Field San Antonio Tex, at the Army school, and will also spend a short time at some commercial flying school The whole course is under the supervision of William B Smith, chief flight surgeon of the State of Connecticut

Edo Increasing Capitalization

COLLEGE POINT (L. I., N. Y.)—Edo Aircraft Corp, located here, through Murray Aldrich & Webb, attorneys, New York City, has filed a certificate in the office of the secretary of state, Albany increasing the amount of its capital stock from $50 000 to $300,000

Single-Place "Traveler" Developed by Pheasant

A PHOTOGRAPH OF THE NEW single-place enclosed Pheasant "Traveler" recently test flown by the Pheasant Aircraft Co Fond du Lac, Wis Note the well-streamlined fuselage and tapered wing The airplane has a wing span of 31 ft 6 in a length of 20 ft 6 in, and a weight empty of 575 lb It is powered with a newly-developed 55 hp four-cylinder in line air cooled engine

Complete First Unit Of the New Buhl Home

DETROIT (MICH)—With completion recently of a new $60 000 brick and steel hangar on its mile-square airport near St Clair, Mich, Buhl Aircraft Co, of Marysville Mich has finished the first unit of a new home that should prove to be one of the most expansive and most modern of commercial airplane plants

The new hangar is the first of six similarly sized hangars called for in the company's plans—these in addition to a large factory and administration building proper on which no details have been worked out Although the first hangar and an ample portion of the new airport already have been put to use, the company it was said is not likely to begin designing the factory building for some time since a lease held on their present location has several years to run Instead, it is planned to continue fabricating all parts at the present plant transferring them to the St Clair property for assembly and test work The two plants are about 8 mi. apart

Postpone Designing of Main Plant

Facilities now on the St. Clair property will be first put to this use early next Spring after which gradual additions to the new plant's smaller units will be made By postponing the designing of their main factory building until such time as the general condition of the industry demands it Buhl hopes to incorporate in the design a number of structural advantages not now apparent to airplane factory builders According to present plans however the factory building will be erected in the northeast corner of the mile-square field and flanked on either side by three of the six smaller units This will place it approximately three quarters of a mile from a supplementary tract, 500 ft x 800 ft in area fronting 500 ft. on the St Clair River, which was acquired by the Buhl interests as a site for a seaplane and amphibion base

Closer to Detroit

The new Buhl plant will be 2 mi. south of St Clair, or 46 mi from downtown Detroit, which is 10 mi. closer than the present Marysville factory As stated, the property comprises 640 acres and is bound on the north by Puttigut Road on the south by Remer Road on the west by King Road, and on the east by the Port Huron and Detroit Railroad right-of-way Approximately 180 acres have already been graded, drain tiled rolled and seeded with grass leaving ready for immediate use runways in six different directions, ranging from nearly one-half mile to nearly one mile in length Before completing the entire airport the company will have cleared 150 additional acres of timber and it probably will be necessary to tile another 130 acres of the tract The tiled portion of the field now is equipped with ten 6 in. laterals, averaging 1 800 ft in length, emptying into a 10 in lead off which in turn carries the water into a sump located near the eastern border of the field An automatic electric pump located at the sump and capable of pumping 22,000 gal per hour, lifts the water about 3 ft., emptying it into a drainage canal extending north and south across the property The property has a natural surface of clay and sand and is exceptionally level The greatest difference in elevation over the entire 640 acres is 12 ft

Hangar Described

The hangar recently completed measures 150 ft x 90 ft., with a lean to, 40 ft x 16 ft constructed to house the building's heating plant and laboratory The building is equipped with 60 ft inside nesting sliding doors at either end, and stands 17 ft 5 in high at minimum clearances A Deluge sprinkling system has been installed and water pressure is obtained from a 60 000 gal tank atop a 70 ft tower near the hangar Water supply comes from a 135 ft well, and is boosted by a 3 hp electric pump With the idea of assembly work in view the hangar has been equipped with a compartment for spraying The hangar is framed with Truscon steel and topped with a Johns-Manville mansard roof A 50 ft concrete apron extends from either end of the structure

Lawrence D Buhl is president of Buhl Aircraft Co, Herbert Hughes vice president and general manager and H P Smith secretary Besides Mr Buhl and Mr Hughes directors are A H Buhl Theodore D Buhl Neil McMath Phelps Newberry and Henry Hecker Lieut Jimmy Johnson is chief test pilot and George B Arnold factory superintendent

Offer Sikorsky Dolly

PICTURED ABOVE is the one man Sikorsky dolly specially designed by Air Associates, Inc., to meet service hangar requirements The device is now being manufactured at that firm's Chicago plant Consisting of two parts—a shoe for the tail skid and a lever arm with fitting and wheels—it enables one man to handle a twin-engine amphibion alone

Atlantic Seaboard Firm Control to Reiffen Group

PATERSON (N J)—Control of Atlantic Seaboard Airways of Washington has passed into the hands of Reuben Reiffen, this city, and associates, according to an announcement received by AVIATION Atlantic Seaboard Airways, previously administered by C E Moran and C L Ofenstein, as chairman of the board and president respectively, owned and operated Hoover Field the Potomac Flying Service Haines Point Seaplane Service, Gettysburg Flying Service and International Airways According to information made available at this time, it is possible that the proposed merger of the New Standard Aircraft, Alliance Aircraft, and Verville Aircraft Co., will eventually be included in the parent organization Both C E Moran and C L Ofenstein have resigned from the Atlantic Seaboard Airways and Mr Reiffen has been appointed chairman of the board and president Associated with him is Fred Huetting of the Paterson Hosiery Co, and others Mr Reiffen announced that there would be no sale of stock in connection with the change of administration of any of the companies involved

Helium Repurifying Proves Advantageous

WASHINGTON (D. C.)—After 19 months the Helium Repurification Plant at Scott Field, Belleville, Ill, has paid off its cost of construction, $44,370, and has, in addition saved the government the sum of $21,514, it was announced by the War Department Dec 27

Helium after a certain period of use in the gas bags of balloons and dirigibles is rendered impure by air that has leaked into the bag, by dust and by moisture When it is first pumped into an airship it is from 95 per cent to 98 per cent pure, but when it has reached a point where it is only 80 per cent pure its lifting power has decreased to such an extent that repurification is necessary

Previous to the installation of the plant at Scott Field it was necessary to recompress the gas taken from the airships, ship it to Fort Worth, Tex where it was repurified and then reship it to Scott Field This procedure resulted in the cost of repurification per thousand feet being $26 00 Repurified locally the process cost the Army Air Corps but $1.25 a thousand cubic feet

New Engine Servicing Platform

ST LOUIS (MO)—A 12-ft. platform, expected to save nearly 3 hr in servicing tri engined planes has been designed by D. E. Garrett mechanic for Southwest Air Fast Express and it is being assembled in that concern's shops Resembling a railway freight loading rack the platform has three opening bays to accommodate three engines

BRIEFLY

Establishment of an airport or emergency landing field every 10 mi throughout the State of Virginia was recommended by Governor Byrd at a recent conference of mayors

Oakland (Calif) Airport will be only 15 or 20 min from the center of the city when a new special speedway to the field is opened this month

Bid of Empire Electric Co Pasco Wash of $23 446 50 was the lowest of five submitted for the installation of thirteen beacons on the Pasco-Spokane airway

Ice-warming devices have been installed on the passenger planes of Stout Air Lines operating between Cleveland, Chicago and Detroit

Residents of Kelly Island who had been stranded in Sandusky, Ohio, by ice and storms which kept boats from operating in the river were enabled to reach their homes for Christmas by the local aerial taxi service, operated by Sheriff John W Parker

City officials of Cheyenne, Wyo have rejected a resolution to charge landing fees at the local airport

During November twenty Southern Air Transport planes were flown a total of 200,000 mi

Boeing Air Transport recently accepted a shipment of over two tons of records for talking pictures to be taken by air express from San Francisco to Chicago

Monterey (Calif) Airport has been bought by T A T -Maddux Lines

A program of air races was held to celebrate the first anniversary of the opening of Los Angeles Metropolitan Airport

The weather bureau is considering establishment of a teletype reporting system between Oakland Calif and Seattle Wash

Loss estimated at $40 000 was caused by a fire in an Alaskan Airways hangar at Fairbanks Alaska, Dec 21

Through ground station relays passengers in a plane 3 000 ft in the air were enabled to converse by telephone with persons on the Leviathan which was 700 mi out at sea

Porter Cable Machine Co Syracuse N Y, has issued a combination booklet and catalog with the title "Turning with Tungsten Carbide"

W H Bowlus San Diego, Calif has received a citation for distinguished service and a button signifying that he is a first class glider pilot from National Glider Association

State Aviation Commissioner Clarence M Knox and a number of prominent business men are urging the city of Meriden Conn to make an appropriation of $154 788 to complete necessary work at the municipal airport

Ivan Chukhnovsky and other Soviet fliers will join in the search for Carl Ben Eielson and Earl Borland, who have been missing since they set out in their plane on an expedition to the relief of an icebound ship near the coast of Siberia, about two months ago

Tampa Fla has adopted rules for the local airport based upon Department of Commerce recommendations

Peter J Brady chairman of the committee on aviation and airports appointed by the Mayor of New York City is making a two weeks' tour of airports throughout the country, piloted by Lieut James H Doolittle

Miss Frankie G Renner secretary of Robbins Flying Service Akron, Ohio, has received a certificate of life membership and a competition license from the Fédération Aéronautique Internationale

Hamilton Standard in Coast Plant

BURBANK (CALIF) — Hamilton Standard Propeller Co, a unit of United Aircraft and Transport Co, has moved into its new factory at the United Airport near here and will in the future supply Hamilton metal propellers for the Pacific Coast territory, according to official announcement Thomas F Hamilton, chairman of the board for the Hamilton company, is personally supervising operations in the new plant In addition to manufacturing and servicing propellers in the new plant, Hamilton will center its experimental and research work here A surfaced runway makes it possible for planes to taxi directly to the propeller factory after landing on the airport

New Firms Announced

INTER-CITIAIR EXPRESS Olympia, Wash by J L Carman Jr T V Arnreiter George W Lemon Arthur L Rulmer and Don Phillips to conduct a flying service

BALTIMORE SCHOOL OF AERONAUTICS, INC 1215 N Charles St., Baltimore, Md capital 1 000 shares no par value stock by Thomas E Pell, Edwin F Cummings, and William C Dorsey

ADAMS FLYING SERVICE INC, St Petersburg Fla capital 50 shares no par value stock by Charles W Adams, Olin King C J Reynolds, to sell and operate airplanes

RADIAL MOTOR SERVICE INC Buffalo, N Y capital $20 000 by Oscar Gagnon Frank L Hoffman Edward J Becker to manufacture engines for air craft

THE W C D AIRPORT CO, Springfield Ill capital $10 000 by H A Willbanks Malcom Catlin and Raymond Davenport to operate a school and flying service

LEKA AEROPLANE CORP New York, N Y capital $20,000 by Theodor Leka Nanni P Mele Themistocles M Leka to manufacture airplanes, air ships, etc

TRADE TIPS

It has been reported that

Kari Keen Aircraft Inc Sioux City, Ia is now engaged in establishing a distributor-dealer organization throughout the country to sell Kari-Keen coupe monoplanes and Fahlin propellers

Fred W Hesse, Buffalo Wyo., is interested in securing a plane which will be especially adapted for use in visiting cattle camps on the plains.

An aero club is being formed in New Bedford, Mass, under the direction of Henry T Olden of Sound Airways The club plans to buy a plane

A flying club in Jacksonville, Fla., of which Mrs W E Sawyer is secretary, expects to buy a plane

Los Angeles Metropolitan Airport, Van Nuys Calif will ask bids for construction of a combined hotel restaurant and administration building of concrete steel and hollow tile.

Flying Club of California, Grand Central Air Terminal Glendale, will construct an administration building and two light plane hangars

R B Barnitz, director of airports for Los Angeles has been granted funds for additional runway surfacing of the oil type

Schools and Colleges

PARKS AIR COLLEGE East St Louis Ill announces that it will hereafter admit women to classes on an equal basis with men A night course for airplane and engine mechanics to last twenty-seven weeks will be offered beginning Feb 1

CURTISS WRIGHT FLYING SERVICE SCHOOL soon to open at the new Curtiss Steinberg Airport near East St Louis, Ill will give 150 hrs of ground-school training to its students

ARROW AIRCRAFT & MOTORS CORP, Havelock, Neb, has opened a trade school with J E McCullough as chief instructor Courses will be given in welding engine mechanics, woodworking and wing building, sheet metal work, rigging and doping

ADCOX AVIATION SCHOOL, Portland Ore reported an enrollment of 105 students late in December, which represented an increase of 50 over the record for the corresponding time in 1928.

Naming of Planes Proves Aid

LOS ANGELES (CALIF)—The Pacific Air Transport, division of the United Aircraft and Transport Co, has named each of its planes after a western mountain The names given are Rainier, Shasta, Lassen, McKinley Adams, Hood, Cascade, Baker, and Diablo, each plane having its name painted prominently on each side of the rudder This feature aids in the dispatching of planes, simplifies telegraph and wireless messages and assists quick recognition of the plane in flight by observers on the ground or in the air

PERSONNEL

T PRESTON SULTAN recently associated with Love Sultan Inc St Louis Mo., has joined Woods Faulkner Co, subsidiary of Woods Bros Corp of Kansas City, dealers in aircraft securities

LIEUT JOHN A MACREADY has been made manager of the newly created aviation department of Shell Oil Company

J A Macready

C R NORTON who was formerly sales manager of Packard Motor Co, has been appointed eastern sales representative of Detroit Aircraft Corp with offices in New York and will supervise sales in all eastern states

GARRETT M AUMENT has been promoted to the position of factory manager of the Teterboro and Passaic plants of Fokker Aircraft Corporation

ROBERT D SHIELDS, T A T traffic agent at Port Columbus, Ohio has been made manager of the office at Waynoka, Okla

CYRIL C THOMPSON, former deputy state auditor of Idaho has been appointed accountant-purchasing agent for Boeing School of Aeronautics, Oakland, Calif

HOWARD HALL, T A T -Maddux Air Lines second pilot, has been transferred from Waynoka to reserve pilot at St Louis. OTIS F BRYAN now at St Louis, will replace Hall at Waynoka.

JAMES A TALBOT chairman of the board of Fokker Aircraft Corp. and Richfield Oil Co, has been elected a member of the board of directors of Aero Corp of Calif, Inc, succeeding NATHAN NEWBY Other directors and officers remain the same.

J A Talbot

H H BOWMAN, district sales manager of American Eagle Aircraft Corp, has returned to the factory after spending several months in the New York territory

DONALD MACRAE, formerly chief radio dispatcher for Western Air Express, has been appointed chief of a new radio development and experimentation department DAVID P GIBBINS has been promoted to the position of chief radio dispatcher.

LIEUT REUBEN D BIGGS formerly army procurement officer at Buffalo, N Y, has been transferred to La France Field, Panama Canal Zone

H W MAXSON, general manager of Air Services, Inc., Akron, Ohio, has been elected president of Akron Business Club

BEELER BLEVINS has been placed in charge of sales for Curtiss-Wright Flying Service at Dallas, Tex.

W A BOHANNAN is now in charge of sales in the southwest for Curtiss-Robertson Airplane Mfg Co

DAN ROCHFORD, aviation editor of the Boston *Transcript* has handed in his resignation effective Jan 6. On that date, he will become Publicity and Advertising Director of Pan-American Airways

THOMAS J HILL has been made pilot for Thompson Aeronautical Corporation and will fly the Chicago-Kalamazoo night mail run

A L MCCULLOUCH, recently manager of the Spartanburg, S C municipal airport has been made operations manager of Compania Nacional Cubana de Aviacion Curtiss Havana, Cuba and will assume his new duties immediately C R COLEMAN will replace him at Spartanburg

J W HUNT has been named production manager of American Aircraft Corporation, Pittsburgh, Pa.

Representatives Named

SUMMERILL AIRCRAFT TUBING—Thompson Aeronautical Corp Cleveland Ohio for Ohio and Michigan to serve airplane rebuilding and repairing bases, but not aircraft manufacturers

CURTISS-WRIGHT — Sidles Airways Corp, Lincoln Neb, distributor for Nebraska, A A Risser, Norfolk Flying School, Norfolk, Neb and the Midwest Aviation Corp, Omaha, Neb, dealers

DAVIS—Truxal & Hightower Kansas City Mo

Firms Arrange South American Sales Research

CLEVELAND (OHIO) — A sales research trip to South America to determine aircraft sales methods suitable there has been arranged by the Great Lakes Aircraft Corp and the American Aeronautical Corp both subsidiaries of Allied Motors Inc. D V Stratton, Great Lakes sales director, announced here

Great Lakes holds the sales franchise for American Aeronautical Corp products in South America The trip will be made by L Ludwin head of the Great Lakes export department and a former Austrian diplomatic representative in South America F Salles de Lorena, former Brazilian Navy flier, and George Gjoerloff, formerly of the U S. Naval Air Service

The three will spend six months in Brazil and Argentina. They have taken a Great Lakes trainer and American Aeronautical S-56 baby amphibion for demonstration purposes An appeal is to be made to the rich landowner and wealthy sporting element of the South American countries

Plan Low-Wing Firm Headed by Moellendick

WICHITA (KAN.)—J M Moellendick, who established the Swallow company here nearly a decade ago is to head a new plane manufacturing concern under organization at Dalhart Tex A low-wing monoplane will be produced by the firm, which, it is asserted, will have Wichita as well as Dalhart backing.

D O Hazelton of Dalhart, has donated a site for the factory, and the chamber of commerce of that town has pledged $14 000 toward the structure The company will start with a capitalization of $50 000 A flying school will be operated in connection with the aircraft factory, nearly a score of students having already been lined up

After disposing of his interest in the Swallow company, Mr Moellendick was forced to retire for a period because of his health, but in recent months he has been identified with the Sullivan Aircraft Co.

Parks Opens Branch Offices

ST LOUIS (MO)—Carrying out its policy of conducting students through a widely distributed sales organization Parks Air College, Inc has opened offices in Toledo O and Birmingham, Ala, according to an announcement by Oliver L Parks, vice-president and general manager The Toledo office is in charge of John A Rose formerly an executive of the Nash Motor Car Co, and the Birmingham office is in charge of William Morrell, former Alabama University baseball star and now a pitcher on the Birmingham Club of the Southern League

AERONAUTICAL CALENDAR

Jan 14, 1930	S A E Aeronautic Meeting, Miami Fla
Jan. 21	S.A E Annual Meeting, Detroit, Mich
Feb 5-12	New York Aviation Show, auspices Aviators Post American Legion
Feb 15-23	International Aircraft Exposition, St Louis Mo
Feb 20	Meeting of Committee on Airport Management Standards and Ethics Hotel Jefferson, St Louis Mo.
Feb. 20-22	Second Annual Aviators Reunion Aviation Post No 651, American Legion Chicago, Illinois
Mar 6-15	Second Annual Pittsburgh Aircraft Show Motor Square Garden, Brown Boulevard Pittsburgh Pa Office is Aero Club Pittsburgh William Penn Hotel.
Mar 17	Regional Airport Conference for New England Providence R I
Mar 26-Apr 1	Cincinnati Ohio, Aircraft Show
April 5-13	All American Aircraft Show, Detroit
May 3-10	New York Aircraft Salon, auspices Metropolitan New York Division Distributor Dealers Section, Aeronautical Chamber of Commerce, at Madison Square Garden New York City

AIR MEETS

Jan 13-15	All American Air Meet, Miami, Fla
Jan. 15-18	St Petersburg, Fla.

AIRPORTS AND AIRLINES

P.A.A. Plans Direct Miami-Cristobal Line

NEW YORK (N Y)—In an effort to cut down the time required between Miami and its South American terminals via the West Coast of South America route Pan American Airways has developed plans for a direct service between Miami and Cristobal in the Canal Zone This would be flown in one day as compared with the three days required to fly the present Miami-Cristobal route by way of Central American points

To operate this direct line the company will install new equipment specially designed to carry a large pay load and at the same time embodying long range capacity and large safety factors. To meet these requirements, the company has ordered subject to approval two 41-passenger Sikorsky S-40 amphibions, the design of which has just been completed by the Sikorsky firm and accepted by Pan American after considerable study on the part of the technical committee headed by Colonel Lindbergh

Route Not Yet Chosen

The exact route has not been selected It would be about 1 400 mi in length and at least one stop would be made for refueling etc Cape de Gracias a Dios was mentioned as one possible halting place As the service is not to be launched for at least a year there is plenty of time for the surveying and selection of the most desirable route. It was explained that the minimum of three days required on the present route through Central America is occasioned by the problem of negotiating mountain ranges at favorable hours of the day

Passenger carrying on the present route has just been inaugurated the first trip under the new policy of the company having been started from the Miami and Cristobal terminals Dec 21 Hitherto only mail and express had been carried. The southbound plane is designated as the Panama Air Limited and the northbound plane is called the United States Limited Only three passengers are carried in each plane With the new Sikorskys, it is expected that sixteen passengers will be accommodated. The 41-passenger capacity will be cut to the lower figure to accommodate additional mail and fuel loads

Design work has been completed for the Sikorsky S-40 amphibion which is expected to be used on the projected line, and construction is to begin at once at the new factory at Bridgeport Conn It has been announced however that the first of these craft will not be completed before Dec 15 1930

The S-40 is similar in general design to the S-38 representing virtually a large scale development of the earlier model, the principal differences being found in power plant and hull structure Four Hornet engines rated at 575 hp each, are to be installed in plane beneath the wing Wood is to be abandoned for metal in the hull structure and the lower wing stubs of the S-38 will be replaced by two streamlined struts which add some 240 sq ft of area to the 1,740 sq ft of the wing

The S-40 is to have a passenger capacity of 41 persons with crew of four and fuel for 4 hr The gross weight is estimated at 28,500 lb According to the present specifications the span is to be 114 ft., the length 72 ft 11 in., and the height 22 ft 11 in

Completing Miami-Boston Lights

WASHINGTON (D C)—Airways beacons have been installed between Atlanta and Jacksonville the Aeronautics Branch has reported. Work of installing beacons on the Jacksonville-Miami airway is expected to be completed some time this month Those will complete the lighting all the way from Boston to Miami

New Mail Rates To Latin America

WASHINGTON (D C)—Air mail rate reductions, effective Jan 1 have been announced by the Post Office Department The rates now are as follows: Mail sent from this country and Porto Rico and the Virgin Islands to the Canal Zone and vice versa $.20 for each half ounce or fraction Mail to Central and South America and the West Indies per half ounce or fraction

	Cents
Argentina	50
Bahamas (Jan. 1 to Apr 30)	8
Barbados	20
Bolivia	40
Chile	50
Colombia	30
Costa Rica	20
Cuba	8
Dominican Republic	10
Dutch West Indies—	
Curacao Bonaire Aruba	40
St Martin, St. Eustatius Saba	30
Ecuador	30
Guadelupe	20
Guatemala	15
Guianas (Br Du and Fr)	30
Haiti	10
Honduras British	15
Honduras Republic of	15
Leeward Islands—Antigua Barbuda Redonda Dominica St Kitts, Nevis Anguilla Montserrat	20
British Virgin Islands	10
Martinique	20
Nicaragua	15
Panama	20
Paraguay	55
Peru	40
Salvador (El)	15
Trinidad	20
Uruguay	55
Venezuela	30
Virgin Islands (U S and Br)	10
Windward Islands—Grenada St Vincent, The Grenadines St. Lucia	20

Young Reviews 1929, Predicts 1930 Progress

WASHINGTON, (D C)—Substantial increases in commercial aviation activities during the year 1929 were remarked by Clarence M Young Assistant Secretary of Commerce for Aeronautics, and he predicts excellent prospects for further increases in 1930 Specifically, he pointed to the growth of scheduled air transport operations from 10,675,000 mi in 1928 to 16,000,000 mi in 1929 with a corresponding record of 85,000 passengers and 8,000,000 lb of mail carried as against 49,000 passengers and 4 000 000 lb of mail in 1928

Even more important as an indication of future possibilities is the fact that established airway mileage increased from 16 000 mi in 1928 to over 35 000 in 1929 Miscellaneous flying grew from an estimated 60 000 000 mi to about 125 000 000 mi. The year 1929 was also marked by a development of aircraft export so that the volume in six months exceeded the 1928 total by 41 per cent. Total aircraft production was about 6 000 In addition, various important technical improvements were made such as development of the "mechavator", improvement of radio range beacon and other safety instruments new speed records, and the beginning of construction of the world's largest dirigible

Foresees Sound Development

As a result of these achievements and prospects Secretary Young said, "All visible indications point to a sound and progressive development of commercial aeronautics during the new year Extension of the Federal airway system will be continued new and additional air mail contracts will undoubtedly be awarded, and still greater use of air transport services for passengers and merchandise may confidently be looked forward to These and other developments will be carried forward in an orderly fashion and may be expected to add to the stability of the foundation upon which the future is to be built"

To Commemorate Old Airline

ST PETERSBURG (FLA)—Sixteen years ago this month Tony Jannus inaugurated a passenger service between this city and Tampa with his seaplane "Benoist" This anniversary will be commemorated by "Tony Janus Day" during the air meet to be held here Jan 15 and 16 At the same time, planes participating in the first Florida air tour will stop at the local airport Two passengers who flew with Janus, and several of his backers will take part in the ceremonies

Ramp Construction Plan Devised at Miami

MIAMI (FLA.)—A new system of constructing seaplane runways or ramps has been devised by O. A. Sandquist of Sandquist & Snow, Miami contractors, and application has been made for a patent on it. The first occasion for employing this method will be in the construction of a seaplane ramp at the west end of the hangar at Miami municipal seaplane base occupied by the Viking Flying Boat Company, for which Sandquist & Snow has the contract. This work will be started as soon as a permit for construction of the ramp is received from the United States government engineer.

The principal advantage of this system will be elimination of slow and expensive under-water work so that such runways may be built quickly, substantially and within a reasonable cost. The runway is removable type so that it can be moved easily to another location. The scheme calls for maximum use of precast and prebuilt units, thus minimizing the underwater work and cutting down installation time.

Floated to Position

The main skeleton frame can be built of wood on land and then floated into position. Previous to this the supporting piles must be driven with timber caps, placed and ready for use. The precast, concrete slabs of sufficient number to overcome bouyancy of the frame then are slid down the runway frame provided for this purpose. Their weight sinks the frame to be required position and it is anchored down with shackles. The shackles are tightened with turn buckles and held in place with wedges. If further anchorage of the shackle collar is needed, a heavy spike can be driven directly over the collar into the pile.

The runway frame then is anchored in position and flooring is placed by launching or sliding built-up wood laminating sections into a slot on the frame until the flooring under water is completed. The runway part that is out of the water can be completed with the most economical ordinary practice considering the loading to be carried.

May Use Concrete Caps

The timber caps may be replaced by precast, concrete caps, in which case a slot is used to take care of the shackle. The frame skeleton also may be in precast, concrete units, but when so built it must be in separate pieces with interlocking separators, so that skeleton units will be placed in position by a derrick instead of being floated to position. The frame skeleton also may be made up of structural steel sections.

The natural slope of the beach or a fill may be used for support in place of pile bents. For under water lighting at night at the foot of the runway and landing areas in front of the runways lamps may be fastened to pilings cut off at the required depth below water.

Embry-Riddle Revises Schedule

CINCINNATI (OHIO)—Change in schedule of the Cincinnati-Chicago passenger service offered by Embry-Riddle Company is announced effective immediately. There will be no change in rates. The new schedule is as follows:

	Pass., Mail Exp	Mail Exp
Lv Cincinnati	5 00 p m (et)	4 30 a m
Ar Indianapolis	5 15 p m (et)	4 45 a m
Ar Chicago	7 00 p m (et)	6 30 a m
Lv Chicago	2 00 p m (et)	9 00 p m
Ar Indianapolis	3 45 p m (et)	10 45 p m
Ar Cincinnati	6 00 p m (et)	1 00 a m

Schedules For China National Line Stated

NEW YORK (N. Y.)—Schedules received here affecting the Shanghai-Hankow air mail and passenger service operated by China National Aviation Corp. (a Curtiss-Keys company) are as follows:

Shanghai to Hankow	
Leave Shanghai	9 00 a m
Arrive Nanking	10 00 a m.
Leave Nanking	10 30 a m
Arrive Kiukiang	1 00 p m
Leave Kiukiang	1 20 p m
Arrive Hankow	3 00 p m.

Hankow to Shanghai	
Leave Hankow	10 00 a m
Arrive Kiukiang	11 30 a.m.
Leave Kiukiang	11 30 a m.
Arrive Nanking	2 30 p m
Leave Nanking	3 00 p m
Arrive Shanghai	5 00 p m

Service was opened Oct. 21 with Keystone-Loening passenger amphibions. A recent report stated that service had been suspended for non-payment of fees by the government but it is understood this suspension was in effect but one day and that service has been resumed.

New Orleans-Panama Passenger Line Urged

WASHINGTON, (D. C.)—Strong influence is being brought to bear on the trunk line railroads serving New Orleans looking to the establishment of airplane passenger service between New Orleans and the Canal Zone. In these days the Panama Canal is a great international crossroads. The project is being supported by the Chambers of Commerce in several cities and by influential persons in New Orleans.

The flying distance between New Orleans and the Canal zone is 1,450 mi. The hop from New Orleans to Progreso, the port on the tip of the Yucatan Peninsula, is 600 mi. but 100 mi. of that would follow the Mississippi River where an emergency landing could be made at any place. There would be 500 mi. of flying however over the open Gulf. The next hop would be 300 mi. over jungle but an emergency landing is available midway. The last hop is 500 mi. long over land but frequent lagoons would make landing possible at almost any time. Estimates have been submitted by the Consolidated Aircraft Corporation of Buffalo for planes having a range of 1,000 mi. carrying twenty passengers. Amphibions probably would be most desirable, it is said.

Alaska-Panama Air Maps Ready

WASHINGTON (D. C.)—The Navy Hydrographic Office has announced the completion of a series of air navigation maps between San Diego, Calif., and the Canal Zone. This completes the series from Juneau, Alaska, to the Canal Zone. A series covering the coast from Eastport, Me., to Port au Prince, Haiti, is expected to be ready next year.

Developing Seaplane Base on Long Island

AT PORT WASHINGTON, L. I., the plant of the American Aeronautical Corporation is being developed steadily. The first unit, representing one side of the U shaped group, is practically complete and the framework on the other units has been in place for some time. The ramp into the water is seen in the lower left hand corner. Savoia-Marchetti machines will be built here.

AIRPORT CONSTRUCTION PROJECTS

East

EAST COAST AIRWAYS, Inc., which plans to establish a passenger and freight service along the Atlantic seaboard, will lease six acres of land on the waterfront from Baltimore as a temporary port. The lease at a rental to be determined later, is to be valid until the municipal airport is completed when activities will be transferred there. A temporary hangar will be erected. A number of Savoia-Marchetti amphibions to be used in the service, have already been delivered.

East Coast Aircraft Corp. will dedicate its new Boston Airport building on Jan. 11 with a formal dinner for the Travel Air dealers and officials of the Wright Aeronautical Corp. and Keystone-Loening company, two firms for which East Coast Aircraft is New England representative.

Erie (Pa.) voters are to decide soon on a proposal to take over the Kearsarge Airport as a municipal project, on the payment of $5,000 each year for five years.

The Worcester (Mass.) city council is considering the advisability of taking over Whittall Field, a private airport near here, and making it a municipal airport.

Central

With negotiations for addition of certain tracts to the Burlington (Ia.) Airport Co. field nearing conclusion the city of Burlington expects to sign all necessary leases with the company before the first of the year and assume management of the field to be operated as a municipal port. Plans for drainage and other improvements are being made by the city engineer's department and work will be started as soon as weather is favorable in the spring. The American Eagle Airport Corp. already has approached the city with proposal to take lease upon the field and operate it as one of its chain of ports but it is understood the plan is not favored by members of the council.

A petition signed by an Illinois delegation asking that money be appropriated to build new barracks and add to the equipment at Scott Field, the Army lighter-than-air station at Belleville, Ill., has been sent to the Appropriations Committee of the House of Representatives, according to Representative Irwin at Belleville. Irwin said that if no results are forthcoming the proposal would be carried to the War Department.

South

It is reported in Richmond, Va., that Julien Eysmans, vice-president of the Pennsylvania Railroad, and Colonel Lindbergh, have agreed to visit Norfolk, Va., to assist municipal authorities in the selection of a suitable airport site.

Aeronautical Retarding Gear, Inc., has acquired 45 acres near Richmond, Va., for a flying field with 2,000-ft. cross runways and a plant to manufacture Davis devices (mechanical pilots for airplanes) and to assemble a specially designed plane for its own needs to demonstrate the value of its devices.

Under a bill reported Dec. 19 by the House Naval Affairs Committee, $700,000 will be spent on airport projects in Virginia by the government. Of this amount $200,000 is for an administration building at the Naval Air Station at Hampton Roads and $500,000 is for grading and filling the flying field at the Marine Barracks at Quantico.

West

Construction has been started on an electrical substation, with an initial capacity of 1,000 hp. at the Western Air Express Los Angeles terminal. It is said that further plans for the electrical equipment which will include underground wiring, electric steam heat and electric automatic controls for doors and signals will eventually bring the investment in electrical work at the field to $75,000.

The $50,000 bond issue voted by the city of Klamath Falls, Ore., for a municipal airport, has been awarded to the state of Oregon on a par bid. Work on the airport has been started.

Wyoming Ports to Get Gas Tax

CHEYENNE (WYO.)—In special session this week the Wyoming state legislature passed a measure which is expected to have a far-reaching effect on the rapid development of airports in Wyoming. The measure provides, in brief, that the state tax of $.04 per gallon on gasoline sold at all municipal airports in the state be refunded to the city in which the field is located for the purpose of improving and maintaining the port. The measure was attached as an amendment to gas tax legislation. The amendment will return to the larger cities of the state a not inconsiderable amount for airport purposes. The income from the tax at the Cheyenne airport last year amounted to more than $6,000 and this amount is expected to be greatly increased during the coming year. Next to Cheyenne, Rock Springs and Casper will benefit to the greatest extent.

Moline Wins Airport Case

MOLINE (ILL.)—On Dec. 18 Judge Long of the County Court, Rock Island, Ill., rendered a decision upholding the right of this city to invoke the eminent domain act in acquiring an airport site comprising 320 acres. A jury has been empaneled to appraise the value of the land. The decision of Judge Long sets a precedent in Illinois and will enable other cities to obtain airport sites by condemnation. It is the first case in the State where the court was called upon to pass on the 1927 statute of the Illinois legislature giving municipalities the power "to acquire or lease land for airport purposes." The defense contended that the right "to acquire" did not imply the right "to condemn."

Improvements Made At Los Angeles Port

LOS ANGELES (CALIF.)—Col. R. B. Barnitz, director of airports for the city of Los Angeles, has announced the opening of the airport restaurant at Los Angeles Airport, under the direction of the Interstate Co. This restaurant opened on Dec. 10, combines a dining room, lunch stand and soda fountain and has a capacity of 150 persons.

Other improvements at the municipal field include the purchase of an airport ambulance, a one and a half ton maintenance truck, a completely equipped fire truck, a small utility truck, a five ton Fordson roller, and a Buick sedan for the use of distinguished guests. A caterpillar tractor and a runway leveller are to be purchased before the end of the year and extensive runway improvements are already under way, while construction of two large hangars recently authorized is to commence at once. Fueling pits are being installed by the Texas, Union, Shell, Hercules, and Standard Oil companies, all of whom have leased sites on the line set aside for fueling purposes. The last grandstand remaining as a reminder of the 1928 air races has now been removed and the field presents a completely unobstructed surface over its entire area.

The newest addition to the list of distributors with headquarters at the municipal field is J. F. Hoffman, distributor for Bird planes, who is now demonstrating from the Los Angeles Airport.

Albany to Have Radio Beacon

ALBANY (N. Y.)—Selection of the Albany Airport as the site for a radio beacon and broadcast station has been announced by Department of Commerce officials. The Department has acquired 25 acres of land near the port, and will erect a four-room bungalow with quarters for personnel, two towers 90 and 120 ft. high, as well as installing the necessary transmitting and receiving apparatus.

D.C. Airport Report Postponed

WASHINGTON (D. C.)—The Congressional Joint Commission on Airports will not present its report, due Dec. 15, until April 15. Senator Hiram Bingham, chairman of the commission, said in introducing the resolution postponing the presentation of the report: "It has been impossible owing to the failure of Congress to act, to secure such progress as was hoped at the time the original joint resolution was passed and approved on March 4."

Correction

In the issue of AVIATION for Dec. 21 the establishment of a seaplane base at Wilmington, N. C., was credited by mistake to Wilmington, Del. The designated anchorage area comprises a space 1,000 x 3,500 ft. opposite the Liberty shipyards, within the city limits.

FOREIGN ACTIVITIES

Junkers States Case In Ford Controversy

BERLIN (GERMANY)—On Dec 9 the law court of Sevilla, Spain, confiscated on behalf of the Junkers company of Germany a Ford plane that had just been unloaded prior to handing over to the Spanish airways company, Classa. This has created a sensation and has been taken to mean the beginning of hostile measures on the part of the Junkers company against the Ford company. Junkers has issued an official statement to the press which, translated, reads as follows:

"Yesterday the competent law court at Sevilla confiscated a tri-engined Ford monoplane which was destined for the Spanish airways company Classa. As is generally known the Ford works have built this type of plane since 1925. The plane, which has a corrugated fuselage and a corrugated wing, already in its outward aspect betrays a strong resemblance to the typical Junkers constructions. Junkers have sued the Ford company in Spain for the contravention of its patents relative to 'wings with a corrugated skin' and to 'directly loaded wings.' Junkers claim that Ford has also infringed other patents.

"As long as Ford made no attempts to export this type of airplane the Junkers company decided not to take any legal steps with respect to the infringements. This resolution had to be pushed aside, however, as soon as it became clear that Ford intended to force the export of his machines to Europe. The general public first became aware of such intentions through the numerous propaganda flights which, in the summer months, were also extended to Germany. The Junkers works, therefore, took the first opportunity of an authentic sale of a machine to Spain to proceed against Ford.

"Before detailed commentaries on this can be made, one will, of course, have to await further developments."

"Owing to some German papers having commented on this occurrence before the legal measures were carried through, some untrue assertions have been published, as for instance, that Ford had for a long time tried in vain to procure Junkers' licenses and that foreign purchasers of Ford planes had annulled their orders upon hearing of the Junkers-Ford differences. In regard to these statements it must be said that Ford has not applied for Junkers' licenses and that direct proofs for the reasons underlying the said cancellation of orders by foreign companies are not at hand."

Interesting also are the commentaries published by some German papers. The *Berliner Tageblatt*, the chief commercial daily of Germany's capital, is of the opinion that Junkers was forced to take such measures in order to prevent a precedent being established. The writer then says that the American designers utilizing the experience gained and paid for by German constructors are able to supply their machines at cheaper prices than the German makers at least at the start to open up a market.

The *Leipziger Neueste Nachrichten*, a very influential organ published at Leipzig, says this occurrence is an alarming example of the battle waged by the European engineer against the campaign of expropriation carried on by American industrial capital against the European and above all the German engineer. The writer refers to occurrences in radio and talking pictures.

Cobham Surveying New Route

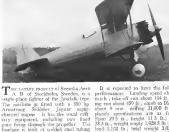
LONDON (ENGLAND)—Sir Alan Cobham left Croydon in mid December on the first stage of his flight to Kenya and South Africa to survey the route for a regular London Cape Town air service. In Africa he will be joined by an Imperial Airways survey party.

English Firm Offers Lower Service Rates

HANWORTH (ENGLAND) — Complete facilities, service and insurance for a private airplane owner are now provided at London Air Park of National Flying Services at rates considerably below those which were generally in effect heretofore. A hangar compartment large enough to accommodate a folded Moth with individual lock, may be obtained for $18.20 per month. Maintenance service on schedule "B," covering routine inspection, minor adjustments, cleaning, and regular check on refueling and lubricating, may be obtained for $4.86 per week.

For pilots who use their planes with considerable frequency, a complete and schedule "A" is offered at $14.58 per week. This makes it unnecessary for the owner to devote any attention at all to keeping his plane in condition. Through the co-operation of National Flying Services, insurance on any plane up to a value of $3,880 including third party insurance up to $4,860 may now be obtained at a cost of $243 per annum. This may be obtained however only by members of National Flying Service clubs who have flown 20 hr or more including 10 hr solo.

Swedish Firm Builds Pursuit Plane



THE LATEST PRODUCT of Svenska Aero A B of Stockholm, Sweden, is a single-place fighter of the Jaktfalk type. The machine is fitted with a 500 hp Armstrong Siddeley Jaguar supercharged engine. It has the usual military equipment, including two fixed guns firing through the propeller. The fuselage is built of welded steel tubing with fabric covering while the wings have rectangular steel spars, wood ribs and a fabric covering.

It is reported to have the following performances: Landing speed about 56 m.p.h., take off run about 164 ft.; landing run about 459 ft.; climb to 16,400 ft about 9 min.; ceiling 31,000 ft. The plane's specifications are as follows: Span 29.5 ft.; height 11.3 ft.; length 23.3 ft.; weight empty 1,928.5 lb.; useful load 1,102 lb.; total weight 3,031 lb.; power loading 6.6 lb per hp. Figures on high speed and the wing area are not available.

Merged French Firms Have $15,720,000 Capital

PARIS (FRANCE) — Capitalization of Societe Generale Aeronautique, the new firm which includes Societe des Moteurs Lorraine, Société Anonyme Nieuport-Delage, Societe d'Emboutissage et de Constructions Mecaniques, Chantiers Aéro-Maritimes de la Seine and Avions R. Hanriot, is announced as 400,000,000 francs ($15,720,000). This is divided into 800,000 shares, of which 340,000 are taken by the organizers, 240,000 are reserved, and 100,000 offered to the general public with par value of 500 francs ($19.60) asking price 530 francs.

It is probable that Baron Nicaise will be chairman of the board, and other directors will be Mlle Deutsch de la Meurthe, M. Level, M. Aynard, Baron de Turckheim, M. Delage, M. du Roy de Blicky, Baron Stienauhlt. Orders totaling 300,000,000 francs ($11,760,000) are reported on hand as the company is organized.

Larkin Building Six-Place Plane

SIDNEY (AUSTRALIA)—Constructional work on the new six-place "Lasconder" monoplane, which is being built by the Larkin Aircraft Supply Company, is nearing completion. The machine is expected to have a cruising speed of over 100 m.p.h., being fitted with three 105 hp Armstrong Siddeley Mongoose engines, any two of which will be sufficient to take off with full load, if necessary. This company recently secured a contract from the Defence Department for the construction, under license, of 32 De Havilland Moth frames.

R. 100 Power Egg

THE RECENTLY completed sister airship of the R 101 is equipped with three of these engine units as compared with five for the latter. Each of the R 100 power eggs has two Rolls Royce Condor engines of 700 hp each, one pusher and one tractor.

New French 28-Passenger Monoplane

THE FRENCH FIRM of Dyle and Bacalan is performing trial flights near Bordeaux, France, with its new all-metal monoplane accomodating 28 passengers and powered with three Hispano Suiza watercooled engines of 600 hp each. The plane has a wing span of 121 ft., overall length of 70 ft. and height of 24.6 ft. The fuselage is partially installed in the wing area which totals 2,153 sq.ft. The engines are carried outside the wing. The fuselage comprises cockpit with dual control and two separation doors, one fire-proof, the other sound-proof, separate compartments for a mechanic, a navigator and a wireless operator, and two side by side cabins connected by a saloon with armchairs and two tables. The height of the cabins and saloon is 6.15 ft.

For day flights each of the two cabins accomodates 10 passengers in two rows of four seats, which can be converted into upper and lower berths for night flights. The fuselage also includes a baggage hold to carry 2,620 lb. of luggage.

Empty weight is 16,940 lb., pay load 6,600 lb., total weight 28,600 lb. Gasoline capacity is 740 gal., providing cruising range of 620 mi. The fuselage is designed to carry twenty wounded persons when being used for ambulance purposes. The landing gear comprises four wheels with brakes, width between each set of wheels being 27.9 ft. All engines are accessible during flight. On the first trial flight, performed Nov. 16, the plane reached an altitude of 3,280 ft. within 4 min. from the time it left the ground.

Report Zeppelin Performance

FRIEDRICHSHAFEN (GERMANY)—While the Graf Zeppelin is laid up here for overhaul and possible changes to adapt it for an Arctic journey, figures on its performances to date are published. It has made 50 flights averaging 1,462 mi. and totalling 73,000 mi. For this distance, the dirigible's engines consumed a total of 8,300,000 cu.ft. of gas fuel, 168,000 lb. of liquid fuel, 31,200 lb. of lubricating oil. There were carried 1,574 passengers, 820,000 pieces of mail, 34,500 lb. of food, 36,250 lb. of beverages and 87,500 lb. of additional useful load. Ten flights of more than 3,000 mi. each were made. The Arctic flight appears to be quite remote, according to latest reports, because of the failure to date of all efforts to secure insurance.

Australia to Try Air-Rail Line

SYDNEY (AUSTRALIA) — Following the recent development of air rail transport in the United States a similar scheme will be put into operation here soon on the 2,187-mi. transcontinental route between Sydney and Perth by co-operation between the Commonwealth Railway Department and Australian Aerial Services. There will be no night flying, the route between Port Augusta and Ooldea being traversed at night in the train so as to afford passengers a maximum of comfort. The trip will take about 35 hr.

Russia Plans to Extend Commercial Air Routes

MOSCOW (U. S. S. R.)—During 1929, there were 12,000 mi. of commercial airways in operation in Russia, and present plans call for the addition of 8,000 mi. during 1930. Scheduled development of airlines calls for the operation of 30,000 mi. by 1933, and it is hoped that this figure will be considerably exceeded, as the great distances and lack of rail transportation in many parts of the country make the need for airways imperative. Expansion of aerial photography and insecticide dusting service also plays a considerable part in plans announced by the Council of Civil Aviation.

Among the lines which are to start operation this year are Moscow-Tashkent (central Asia), Khabarovsk-Sakhalin Island, Kharkov-Odessa, and others. Service over the Moscow-Irkutsk line will be increased.

French Pilot Has Unique Record

LONDON (ENGLAND)—One of the leading Croydon pilots, M. Jaques Corsin, has just been rated by the Aero Club of France as the holder of one of the finest flying records in the world. During the twelve years since M. Corsin obtained his pilot's license he has flown 6,533 hr., covered 625,000 mi., and carried 10,000 passengers without any accident whatsoever.

WHAT OUR *Readers Say*

Stick, Unstick and "Deadstick"

TO THE EDITOR

In answer to Howard K. Iling of Pittsburgh relative to "stick" and "unstick" as aviation terms, may I suggest that aviation use three "stick" terms, namely, "stick," "unstick" and "deadstick," meaning roughly, with motor, as in takeoff; without motor (motor idling), as in landing; and with dead motor, i.e., after a conk or with switch cut, or both. The reason for these terms is that they are explicit to those understanding them and to save words.

A doctor says, "the quadriceps extensor femoris" when he means "the muscle with four fastenings which elevates the thigh bone." He saves thereby seven words. "Stick" and "unstick" save just as many words.

Some other terms might be substituted, but in the formation of a language, what comes first usually remains.

WOODY KANI
Daytona Beach, Fla.

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Deflating a Big Statement

TO THE EDITOR

Some days ago the French press was somewhat stirred by an announcement originating from the British paper, "The Daily Telegraph," stating that a New York firm intended to build a giant transatlantic plane intended for commercial Paris-New York service. The machine was said to have 492 ft. wing spread, 12 engines of 1,000-hp. each; it should be able to carry 500 passengers, a crew of 100 and fly at several miles high where a speed of 500 m.p.h. was to be reached, enabling the distance to be covered in 6 hours. The makers were said to be satisfied that the plan was perfectly practical and they were ready to start the construction of two of these monsters at the cost of $5,000,000 each.

Although the data supplied was too meager to enable one to acquire a complete opinion of the characteristics of the projected machine, I thought it interesting to go into the matter a little more deeply and try to investigate the aerodynamical efficiency of the design. The result of my innocent calculations is given below.

The gross weight of the plane is not given, but a minimum figure can reasonably be arrived at.

Weight of 600 people at say 200 lbs. each, 120,000

Weight of fuel. Assuming that the engines are Diesel consuming only 0.42 lb. hp. hr., that the machine will fly at 11/12th of maximum power and that no reserve fuel is carried the fuel load will be

$6 \times 0.42 \times 11{,}000$ ... 27,700 lb.

The total load carried is thus ... 147,700 lb.

Assuming that total structure weight is only 40 per cent of gross weight, a very optimistic figure in the present state of affairs, one gets for gross weight

$$W = \frac{147{,}700}{0.6}$$

$$W = 246{,}000 \text{ lb.}$$

If the propeller efficiency is taken to be 0.8, a generous assumption, the $\frac{L}{D}$ for the whole machine to fly at 500 M.P.H. or 734 feet per second must satisfy the equation

$$500 \times 0.8 \times 11{,}000 = \frac{D}{L} \times 246{,}000 \times 734$$

or

$$\frac{L}{D} = 37.3$$

The best performance for airplanes is now somewhat under 10 when flying near maximum speed, the highest figures ever recorded do not exceed 16 to 17 *for maximum* $\frac{L}{D}$ achieved of course for a speed far below maximum.

R. DE MAROLLES
Paris, France

[Our correspondent's manner of receiving the interesting pronouncement referred to is most pleasing to our critical and conservative spirit. A healthy state of mind is properly cynical and it would be indeed satisfying if those interested in reporting various scientific projects would emulate Mr. de Marolles and promptly take apart and analyze some of the "authoritative" statements prepared by over-enthusiastic aeronautical experts before giving them publicity.—Ed.]

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Dilemma

TO THE EDITOR

I am thinking of four major air transport accidents that have happened this year, and in each case the public is informed that the pilot is blameless. To make matters worse, in each case the public is further informed that the ships had been thoroughly inspected and pronounced perfect in every way. Lining up these two statements side by side the public can only deduce one conclusion—that aircraft are yet to be made safe for air transport. We know that this latter statement is not true, yet when expert pilots can do no wrong, what other result can be expected?

There seems to be a great divergence of opinion concerning crashes. One school of thought maintains that the pilot is better for that experience; the other believes that if a pilot erred once there is a possibility it may occur again.

The above statements come from two leaders in air transport.

It is not my purpose to decide what school of thought is correct or whether the pilots are blameless or not, but when perfectly well known and approved planes are crashed by expert pilots, surely one or the other is at fault, and if the blame is placed on neither pilot nor ship we can only mystify the public by throwing in a gust of wind.

CLINTON P. JESSUP
Guggenheim School of Aeronautics, New York University, New York City

[Mr. Jessup is quite right in his assumptions about the evil results which inevitably follow misleading statements of any kind. Particularly to be condemned in connection with airplane accidents is the practice of "whitewashing" individuals or equipment at fault. It is interesting to consider that both the Army and Navy air services have stated that 90% of the service plane crashes are traceable to the "human element." The same proportion if not higher applies to automobile accidents and the remedy is the same in both cases: increased efforts toward perfection in operation, and increasingly stringent regulations in the maintenance of the highest operating standards.—Ed.]

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The Cause of the Slump

TO THE EDITOR

Without wishing to assume a position of one speaking in authority, I am led to differ with the opinion expressed editorially in a recent issue of AVIATION pointing to the obvious business slump within the aviation industry as a seasonal lull.

I feel that there is nothing to be gained by making such assertions when there are sufficient facts to establish the actual cause of the present reversion.

Although, it is possibly true that in past years the Aviation Industry has experienced a reduction in flying activity in certain sections of the country during the inclement weather of winter and early spring, it can hardly be claimed that this is the important factor bearing upon the present condition.

If it is true that seasons are to have such a marked influence on the sales of aircraft then the building of airplanes must always be a sort of "hand to mouth" vocation.

To face the true facts, isn't it to be generally admitted that the present status of things is brought about through the fault of the industry itself?

Six months ago airplane manufacturers were rushing at top speed to get ships off the line. They erected new buildings, bought expensive machinery, purchased large quantities of materials, hired workmen, and started into production on a reckless scale. They didn't stop to figure if there would be a market for their ships. No one dared doubt that there was a market since everybody was investing in aircraft securities and the subject of flying was on everybody's lips.

Suddenly it is discovered that the public will not buy airplanes spontaneously but that it is necessary to go out and sell them to the public. Unhappily, the manufacturer hadn't bothered much about a sales force. He had expected to find buyers flocking to the factory door, eager to snatch new ships as fast as they came off the production line.

This, in my opinion is the real cause of the present slump. It is not going to be any better during the sunny summer days of 1930 unless the industry is willing, by that time, to spend some of its extra millions to perfect a sales organization and make a proper study of the sales outlet.

FRED P. MARSHALL
Aero Supply Manufacturing Co., College Point, N. Y.

[This publication has on several occasions endorsed both directly and indirectly, the position taken by this correspondent. But that a very definite depressing influence upon the business results with a change of season is too obvious to be argued. The simple fact that manufacturers have committed all the errors above cited has inspired some of AVIATION's most vociferous complaints, and undoubtedly will continue to do so until the condition is corrected.—Ed.]

Editorial Comment FROM THE DAILY PRESS

Why Some Folks Will Not Fly

THE NEXT NATIONAL AIR MEET may come to New England.

We hope that it does come here. If it comes here we hope that it will be an air meet different from many that have been held elsewhere. We hope that it will not be an exhibition of daredeviltry.

It is argued that one does not know what a plane will do unless it is tested in all sorts of maneuvers. The place for testing machines is at testing grounds and not at public air meets where people cringe in terror at the mad antics of airmen made careless by the hope of thrilling the populace.

Let it be an air meet that makes much of safe flying and not aerial acrobatics. Show the people that flying is not a stunt. Have plenty of [illegible] in the air, flying as the people would like to fly. Show how easy it is to land slowly and in a small space. Show how steadily machines of all types fly. Have exhibition halls where the people can get close to and touch airplanes, yes, and sit at the controls. Take people flying. But they will never go flying if they see men dashing themselves to pulp.

The airplane is a comfortable and reasonably safe means of transportation. The public is willing to be convinced. —BOSTON TRAVELLER.

New Volumes FOR THE SHELVES

Educating the Aviator

AVIATION FROM THE GROUND UP, by *Lieutenant G. B. Manly. Frederick J. Drake & Co., Chicago, Ill. 1929. $3.50. 373 pages.*

EDUCATION has been termed briefly as the process by which we enable an individual to utilize his past experiences in meeting the situations which life brings to him.

We are just beginning to realize the necessity of more adequately preparing aviators to meet the situations which a life in this profession brings. One of the evidences of this realization is seen in the recent action of the Department of Commerce in requiring ground school instruction in addition to that instruction which the pilot receives in learning to fly. Already a system of education is coming into being which might roughly be termed "Aeronautical Education."

As might be expected, a considerable amount of the early content in this field consists of that which people think ought to be utilized in educating the aviator without very much reference to the actual situations which he must meet in everyday life. However we are now beginning to get considerable literature of a practical nature. The book under review is one of the better examples of this sort of literature. The author apparently recognizes that the ground school and the flight school are two integral parts of one great enterprise. He is keenly aware that the problems which confront the aviator are of an intensely practical nature. In addition to this, he is conscious of the fact that aviation has already become such an integral part of our civilization that men and women everywhere are daily confronted with situations demanding intelligent discussion of this subject even though they do not expect to learn to fly themselves. He has prepared the book to meet the needs of both groups.

The many ground schools which are rapidly coming into being all over the country will find the book of sufficient technical merit to warrant its use as a text up through the limited commercial course at least. For this use, however, it has two weaknesses, one of which is rather serious.

The section given to aeronautical nomenclature is in error in far too many instances. For example, the author describes "nacelle" as "another name for the fuselage," which is quite misleading and can only serve to add to the chaos which now exists in the field of aeronautical nomenclature. There is a tendency on the part of the more authoritative books on aeronautics to use as a source for their nomenclature the official bulletin of the National Advisory Committee for Aeronautics Report No. 240 entitled "Nomenclature for Aeronautics." One can sympathize with the efforts of authors to make this nomenclature intelligible to laymen, but it is difficult to see anything in favor of either changing the meaning of the definitions or taking definitions from sources which are either antiquated or are unreliable. In this volume, the author has apparently fallen into both of these errors. About the only procedure one can follow in using this book as a text, therefore, is to supplement it with the N.A.C.A. report mentioned.

Again, the author has included the old edition of the Air Commerce Regulations and Air Traffic Laws—probably because the text was written before the September 1st edition was available. Here, too, the work should be supplemented with the latest edition of the Air Commerce Regulations, including bulletins 7A and 7B, all of which may be had gratis by writing to the Aeronautics Branch of the Department of Commerce.

In other respects the book will be found adequate for elementary ground school instruction.

Its greatest value, however, will be found in meeting the needs of the second or lay group who seek aeronautical information to enable them to intelligently discuss the subject with their friends. For example, Commander

Bird flies over the South Pole and a report of it is published in the newspaper It is immediately a topic of conservation with hundreds of people How was he able to find his way back to the starting point when every direction from the Pole is North? This and a dozen other questions are current topics of conversation "Aviation From the Ground Up" answers these questions in language which the layman can understand Again "How is it that a mass of metal weighing three or four tons can sustain itself in a fluid weighing but an ounce per cubic foot" is a common question of the layman This is all carefully explained in the part of the book dealing with the Theory of Flight and Aerodynamics The subject of Aircraft Engines is well treated, as is that of the Propeller In addition there are chapters on Airports and Airways and some indication of business prospects in this field. All of the sections of the book are well illustrated

In spite of its broad scope the book is compact and all of the material presented in an attractive manner

—ROLAND H. SPAULDING

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Flying Instruction Lore

HOW TO FLY *by Barrett Studley The Macmillan Company New York City 1929 288 pages $3.00*

THE LORE OF FLYING in the instruction stages as derived from years of experience as a teacher of Navy fledglings is contained in the second book by Barrett Studley, of the Pensacola Naval Air Station The reader is taken through the interesting evolution of a brand new flying student to the finished pilot via paragraphs which are closer to the narrative in form than the exposition and naturally enough this evolutionary process is surcharged with the Navy methods, although the book is written primarily as a guide for the civilian The Navy flavor is strongest in the many anecdotes used to illustrate points the author wishes to emphasize.

While not exactly a textbook on the subject of learning to fly, the book could be read with profit by any student whether civilian Army or Navy candidate It could be read with profit also by the pilot with hours to his credit for included in Lieutenant Studley's "lore" are many excellent reminders of what to do or not to do and when and how In fact these reminders or tips, stated in just about the right degree of emphasis make the book worthwhile for most everyone spending much time in the air

It starts off in an historical vein, then goes into a non-technical discussion of why an airplane flies and how it and the engine are built The balance is devoted to chapters dealing individually with the matters of preparing for instruction, training in turns take-offs, landings spirals stalls spins stunting precision landings solo flying cross country work etc All aspects of each seem to be well covered Common faults and corrective maneuvers are described in detail and buttressed by examples culled apparently from Lieutenant Studley's long experience with students of various abilities

The average instructor of civilian students may consider Lieutenant Studley's schedule of progression in the various departments of flight training a bit conservative In the last analysis however this progression is a matter of some opinion and one suspects that the tendency today at least in the larger commercial flying schools is toward a schedule similar to what he recommends Certainly, if he is conservative it is to be applauded rather than condemned since flying merits more of the rational type of caution than it sometimes is given The book could well be included in any "fireside flying" done this winter

Abstracts AND *Reviews*

Racing Airfoils Tests

TESTS OF FOUR RACING TYPE AIRFOILS IN THE TWENTY-FOOT PROPELLER RESEARCH TUNNEL *By Fred E Weick N.A.C.A Technical Note No 317*

TESTS of the high-speed aerodynamic characteristics of four racing type airfoils (N-9, N-38 C-62 and N-46) were made in the 20-foot Propeller Research Tunnel.

The N-9 section was obtained by reducing all of the ordinates of the Gottingen 398 in the same proportion and the N-38 was obtained by similarly increasing the ordinates of the R.A.F. 25 The N-46 was the C-62 with a rounded leading edge.

The lift and drag forces were measured at an air velocity of approximately 100 m.p.h and at angles of attack varying by 1-degree intervals from that for zero lift to +4 degrees The Reynolds Number was about 2,800,000, a value sufficiently high so that a further increase might be expected to have an almost negligible effect on the aerodynamic force coefficients

Of the four sections the N-38 and N-46 had the lowest minimum drag coefficient each having a value of C_{Dmin} = .0073 The values for the C-62 and the N-9 were .0083 and .0088 respectively Rounding the sharp nose of the C-62 resulted in a reduction of 12 per cent in its minimum drag

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Aviation "Fakes"

BULLETIN OF THE NEW YORK BETTER BUSINESS BUREAU *Special Aviation Number, 1929*

THE WILES of fake promoters unscrupulous or misguided traders upon aviation's popularity, and professional misrepresentation of all kinds is dealt with in this organ Specific warnings are issued and individuals mentioned which matters will be passed over by the reviewer with the suggestion that definite information is thus made available for anyone interested enough to write the Better Business Bureau for it.

Particularly have these authorities dealt with the "fake" school situation These charlatan institutions have been serious pests for the last few years and while there are still a few extant the seriousness of their activities has been diminished by governmental interference and the increasing stiffening of aviation school requirements. There is apparently nothing that can be done with the correspondence schools who propose to teach flying by textbook Stress is laid upon the fact that the very manner in which aviation investments have been treated by newspapers and the general public has aided unscrupulous promoters in their nefarious activities The solidity of the industry has been so effectively portrayed that many thousands of dollars have been wasted on the notion that any aviation investment is safe merely because aviation itself is on the highroad to success

It is reported that since the summer of 1928 the records of 187 aviation companies have been investigated and most of them found to be respectable and safe A substantial number of the balance while not sound have been definitely established as afflicted with carelessness poor organization and other forms of maladministration The outright frauds have in most cases been summarily disposed of

The principal virtue of the bulletin itself is that it commends one to careful study of all aviation investments and points out the most likely errors of the enthusiast

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Ownership Expense in England

FLYING AND MAINTENANCE FROM THE OWNER'S POINT OF VIEW *paper read before the Royal Aeronautical Society by Squadron Leader H M Probyn. Published by the Society*

FACTS AND FIGURES in considerable detail are given by Mr. Probyn to establish his contention that the cost and trouble of maintaining a light airplane, at least in England, are little more than corresponding expenses for a medium-sized automobile, provided the two are used to about the same extent If comparison is made on the basis of touring continental Europe, or northern Africa the balance seems to be decidedly in favor of the plane

Those who are not mechanically inclined may be a little surprised when Mr Probyn suggests that the average private owner should be able to do for himself all the necessary service work on his plane except major overhauls However, this represents his own experience as a light plane owner and pilot, which seems to be extensive, and his careful directions for inspection and adjustments are clear and concise.

He estimates the yearly cost of operating a plane with 90 hp engine flying about 12,000 miles as approximately $1,550, of which about $915 is for depreciation and insurance, $25 for certificate of airworthiness $610 for housing fuel, oil, and maintenance. This makes the total cost about $.13 per mile and the operating cost alone a little more than $.05 per mile It must be remembered, of course, that these estimates are made for present conditions in England for a light two-seater plane of the general type of the Moth.

Except for the insurance, these charges compare very favorably with the English cost of operating an automobile about the size of our Pontiac or Plymouth, and the author believes that insurance against flight risks is not necessary for a careful pilot Insurance against injury to a third party may be obtained for less than $50 per year This would reduce the total annual cost to about $1,300, or a little more than $.10 per mile For purposes of further comparison, Mr Probyn estimates the annual cost of operating a five-passenger, three-engined flying boat as $8,550 for 54,150 miles and the cost of operating a 45 hp single-seater as $1,040, for 9,750 miles Both of these figures include complete insurance coverage, and for the flying boat $1,825 is also included as wages for a pilot-mechanic. This last item is in striking contrast to the cost of similar services in this country

New Patents

Airplane with Foldable Wings

1 739 700 AIRPLANE. GEORGE E. MCCREA San Francisco Calif Filed June 11 1929 Serial No 254 353 9 Claims (Cl. 244 12.)

AN AIRPLANE WING is formed in three sections —a narrow middle section overlying the fuselage and end sections pivoted on the middle section A link at each side is pivoted on the fuselage at one end and at its other end is pivoted on an end section of the wing, so that when the middle wing section is raised the links are intended to swing the end wing sections against the sides of the fuselage The pilot is provided with a handle which is connected to the middle wing section by links and crank-shafts designed to move the wing first to the rear to unlock it from the fuselage and then to raise the middle section to permit the end sections to swing against the fuselage.

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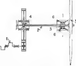
Propeller-Shaft Support

1,740 262 PROPELLER-SHAFT SUPPORT OTTO MADER, Dessau Germany assignor to Hugo Junkers Dessau Germany Filed June 30 1928 Serial No 289 528 and in Germany July 18 1927 7 Claims (Cl 244—29)

IN ORDER to reduce vibration of the propeller shaft, bearings are provided designed to permit the shaft to adjust itself until its center of gravity lies in the axis of rotation For this purpose the shaft is connected to the driving mechanism at its inner end by a universal joint which permits the shaft to pivot in any direction and near its outer end close to the propeller, there is provided a spring-supported bearing intended to permit radial displacement of the shaft



The illustration shows engine shaft 1 propeller shaft 2 propeller 3 universal joint 4, spring supported bearing 5 and springs 18

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Parachute

1 740 044. PARACHUTE. GEORGE M SIMMONS Cohay Miss Filed Jan 25 1928 Serial No 249 413 2 Claims (Cl 244—21)

THE RIM of the parachute canopy is connected by cords to an attachment member which is attached to the wearer's body A hoop, which is on a level with the canopy rim when the parachute is opened is suspended from the apex of the canopy by cords which extend to the attachment member. Other cords connect the canopy rim to the hoop to maintain the canopy in a given position with respect to the hoop When not in use the canopy is folded on the hoop It is stated that the hoop forms a funnel which directs the air into the canopy and that the cords leading from the attachment member to the hoop and then to the apex pull down upon the apex when the parachute is launched to assist in spreading the canopy

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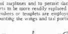
Assembling and Repairing Device

1 740 021 ASSEMBLING AND REPAIRING FLYING MACHINES HUGO JUNKERS Dessau, Germany Filed July 22, 1925 Serial No 45 351 and in Germany Aug 9, 1924 6 Claims. (Cl 244—1)

IN ORDER to facilitate the assembly of airplanes and to permit damaged parts to be more readily replaced joint members or templets are employed for mounting the wings and tail portion on the airplane body The templets are of such shape as to continue the stream line contour of the parts which are joined together



The illustration shows template 1, 2 for attaching the wings 3 and tail portion 4 to the body 5

• • •

Variable Propeller Setting

1 740 089 AIRCRAFT - PROPELLING MECHANISM CHARLES S HALL, Los Angeles, Calif assignor to Hall Engineering & Aircraft Construction Company a Corporation of Nevada. Filed Jun 5 1928 Serial No 244 079 5 Claims (Cl 244—25)

A PROPELLER is carried by a sleeve which is pivoted on a horizontal axis so that the propeller thrust may be directed down or up with respect to the aircraft as well as along the usual horizontal axis of the craft The drive from the engine to the propeller lies through a shaft and gearing supported in the sleeve For rotating the sleeve there is provided a reversible bevel-gear connection between the engine and the sleeve, and electromagnets for moving one or the other of the bevels into connection with the engine to drive the sleeve in one direction or the other.

THE BUYER'S LOG BOOK

Pioneer-Waltham Clock

A NEW AVIATION CLOCK for recording time of flight has been manufactured by the Waltham Watch Company to specifications by the Pioneer Instrument Company 754 Lexington Avenue, Brooklyn N. Y. A novel feature is the

Clock designed to show flight duration

extra pair of red hands set by hand to mark the starting time. They remain in this position and at the end of the flight the difference between the red hands and the clock hands gives the flight duration.

The clock is finished to match all other Pioneer instruments so that it is interchangeable with other instruments on the board and the diameter and mountings are Army, Navy and S.A.E. standard. It is provided with a luminous dial and has a large second hand and double mainspring with the winding and setting knob placed in front and at the bottom to render it accessible. The clock is standard in two movements type 543 having a 7 jewel and type 544 a 15 jewel movement.

U. S. Valve Refacer

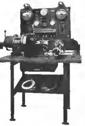
AS A RESULT of many months of experimenting and service a new valve refacer model VR3 is now announced by the United States Electrical Tool Company Cincinnati. It is claimed that this refacer can be operated without difficulty by the cheapest help in any shop. It accommodates valves having a stem of ⅝ in. diameter or less, of any length, with head up to 6 in. in diameter, and is easily set for any angle from 15 to 90 deg. Larger chucks can be obtained at extra cost.

The grinding spindle runs on SKF ball bearings and is driven by a fabric belt from a universal motor mounted on the same base with the spindle housing. The valve holding spindle is run by a separate belt from another universal motor. Both motors operate on alternating or direct current, 60 cycles or less.

Standard equipment includes a diamond wheel dresser cutter grinding indexing support, and complete electrical connections. It can be equipped with grinding attachment for both straight and spiral reamers rocker arm grinding attachment, tappet grinding attachment, and attachment with micrometer adjustment for grinding ends of Model A Ford valve stems. A steel table with valve rack can also be furnished.

Weidenhoff Equipment

THE Joseph Weidenhoff Inc. Chicago Ill. furnish shop equipment for battery and electric service including a 110 volt A.C. No. 942 supercharger for aircraft and auto magnetos and a test bench model 31. The supercharger designed to eliminate the use of storage batteries is furnished with five sets of auxiliary pole shoes making it complete for charging all makes of magnetos and magnets. The equipment



Model 31 test bench

includes everything required for automotive and aircraft magnetos and four additional sets of pole shoes may be obtained. The weight is 152 lb. and the overall dimensions 12 in. high x 9 in. long x 14 in. wide.

Model 31 test bench for use in electrical service operations has an all metal flexible drive and an automatic centering vise which permits testing generators without removing the coil cutout, or distributor and offers easy access to distributor and brushes. The motor develops 3¼ hp. and provides a speed 0-3 600 either direction through a hand lever directly connected to the brush shifting yoke. The distributor assembly is tested vertically, the mechanism for driving the distributor being directly connected to the motor shaft through enclosed silent worm gear running in oil. Universal three jaw scroll chuck on the end of the driving spindle clamps on distributor shaft or over gear, providing for all types of distributors now in use as well as new types. The rotary spark gap is mounted in horizontal position immediately under and connected with the distributor shaft. A tachometer calibrated 100 to 4 000 r.p.m. for right or left hand rotation is connected to the motor shaft.

TRADE CATALOGS

WIRE PRODUCTS. The wire products manufactured by the C. O. Jelliff Corp., Southport, Conn., are described in a 32 page catalog recently published and beginning with a discussion of the various weaves, meshes and materials frequently used. Tables of wire sizes are given, followed by illustrations and price lists for wire and screen cloth in various materials and for other products such as dipping baskets, conductor strainers metallic filter cloth and framed screens.

THE BOOK OF THE MOTH. A 39 page publication of the Moth Aircraft Corporation discusses in some detail how the Moth plane is made and its uses in different parts of the world under various operating conditions. It takes up the question of flying for the average man, giving figures on expenditure. Specifications and information on service are also included.

BATTERY CHARGERS AND SERVICERS. A short bulletin was recently published covering Burton & Rogers battery chargers and servicers with equipment. This describes two full wave chargers for average storage batteries, two half wave for small service stations and two models in battery servicers.

AVIATION LIGHTING. A booklet entitled "Looking Ahead in Aviation Lighting" was recently published by the Edison Lamp Works of General Electric Company. The bulletin summarizes the part played by light in the service of aviation and calls attention to airport lighting requirements that are likely to be encountered in the future. Various lighting installations for the airport, hangar and plane interior are illustrated.


Desoutter
Sportsman
Emsco-Cirrus
Student Prince
Baeprische O F W M-23
Populair
Rucobler
Victor
Macchi M70
All of These Planes are CIRRUS Powered!
The world-wide trend toward the in-line type of engine, led by Cirrus, is evidenced by these photographs. Cawling, mounting, lubricatian and servicing advontages are omong the features that oppeol to the designer. A reproduction af these twa poges suitoble for framing is yours far the asking.
Simmonds "Spartan"
Whittelsey Avian
Ogden Osprey
Westland Cabin Type
Westland IV Limousine
Macchi M53
Cutty Sark
Westland Widgeon
Raabkatzenstein R K 25
Great Lakes Trainer
Cantiere Navale Triestino
Piaggio P9.
Blackburn Bluebird
Avro Avian
Koolhoven
DeHavilland Moth
The Americon Cirrus Engine is the first of a growing family of Americon Engines. Let us work with your organizotian on power plont problems.
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Cierva Auto-giro
Breda 15
Ladybird
Burnelli
Great Lakes Speedster
Breda Seaplane
Dornier Cirrus Libelle
Short Mussel

"We need a plane—
even our chief engineer travels 35 days a year"

TRAVEL in business is a necessity. A survey conducted by one manufacturing company showed that even the chief engineer traveled 35 days each year —time that cost a total of $2,804.20 in salary, and was lost for productive work while he was away from his desk. In addition, every other important official, from president to assistant sales manager, averaged more than 4 days a month on the road—time that could have been reduced to a minimum by the use of fast air transportation.

The total travel bill for this firm last year—including salaries and other expenses—was $22,748.00. As a means to economize, one of the executives advised the president to purchase an airplane — and after a thorough investigation the company bought a Ryan Brougham. While the Ryan cost $13,250.00, it actually paid for itself in one year in time saved. And, more significant still, the company has since secured more business, made more contacts and enjoyed greater prestige than at any other period in its history.

In this country of vast distances and dollars-and-cents valuation on time, Ryan airplanes are business assets. With a speed of 150 m. p. h. and a cruising range of 700 miles they save countless hours and enlarge every executive's field of activity. And a Ryan costs but thirty-two cents a mile to operate — with allowance for writing off the entire depreciation in the first year.

Let us tell you more about Ryan airplanes — show you how they can completely solve the transportation problem for your company.

BUILDERS OF LINDBERGH'S RYAN "SPIRIT OF ST. LOUIS"

DETROIT AIRCRAFT

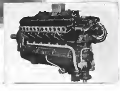
UNION TRUST BUILDING, DETROIT

WESTERN OFFICE ROOSEVELT BUILDING, LOS ANGELES

RYAN AIRCRAFT CORPORATION
LOCKHEED AIRCRAFT CORPORATION
PARKS AIR COLLEGE, INCORPORATED
AIRCRAFT PARTS COMPANY, INCORPORATED
PARKS AIRCRAFT CORPORATION
EASTMAN AIRCRAFT CORPORATION
BLACKBURN AIRCRAFT CORPORATION
AIRCRAFT DEVELOPMENT CORPORATION
MARINE AIRCRAFT CORPORATION
GROSSE ILE AIRPORT, INCORPORATED
GLIDERS, INCORPORATED
DETROIT AIRCRAFT EXPORT CORPORATION

Thoroughbreds . .

ARMY P-6 HAWK—top speed over 180 miles per hour. The Air Corps' high-performance fighter powered by the reliable Conqueror engine.



CURTISS CONQUEROR ENGINE—12-cylinder, geared, liquid-cooled, Vee type engine that sets new performance records for fighting planes

Curtiss' Engineering Leadership Has Developed Two Thoroughbreds P-6 Hawk and the Famous Conqueror Engine

THE Curtiss P-6 Hawk is a thoroughbred. It's the latest development of the distinguished Hawk series of fighting planes.

The outstanding performance of the Hawks in the service of the crack fighting squadrons of the Army and Navy has become famous throughout the world.

Now refined in design and powered with the liquid-cooled, geared Curtiss Conqueror Engine of 625 horsepower, the new P-6 Hawk sets new standards. Its top speed is in excess of 180 miles per hour. The Hawk rightfully takes its place as the leader in performance and manoeuverability in the Air Corps. The Conqueror Engine, with which the Hawk is powered, is also a thoroughbred. Its predecessor, the famous Curtiss D-12 Engine, has been the high-performance aircraft engine in this country and abroad since its introduction.

The Conqueror develops 625 horsepower delivered through a geared propeller. It is exceptionally compact, low in frontal area and inherently reliable. It has been proven a truly remarkable engine by its long use in the government air service branches.

Curtiss Aeroplane & Motor Co., Inc. Office, Garden City, Long Island, N. Y. Factories, Garden City and Buffalo, N. Y.

CURTISS AEROPLANE & MOTOR CO., INC.

THE KITTYHAWK

Some experienced pilots have taken the Kittyhawk into the air tried to spin it and failed Others have succeeded but even they have been unable to hold the Kittyhawk in a spin for more than half a dozen turns

With a landing speed of 38 miles per hour with a wheel tread of seven feet two inches the Kittyhawk is particularly adept at getting in and out of small rough fields in fact the Kittyhawk has all the safe flying characteristics which makes it a very desirable plane for the student and inexperienced pilot . and yet the expert will find that it will out-perform most every plane in its class

Write to us we shall be glad to send you further information about the Kittyhawk.

COMPANION
TO THE
VIKING
FLYING BOAT

THE VIKING FLYING BOAT COMPANY
89 Shelton Avenue, New Haven, Connecticut
Miami Hangar — Municipal Airport, Causeway Island

SPECIFICATIONS

Kittyhawk Model B-4

Engine — Kinner K-5	100 H P	Weight empty	1107 lbs.
Approved Type Certificate No 165		Useful load	768 lbs.
Length overall	22 ft 11 in	High speed	110 m p. h
Height overall	8 ft 8 In.	Cruising speed	90 m p. h
Span both wings	28 ft.	Landing speed	38 m p h
Chord both wings	4 ft 6 In.	Climb	1100 ft. p m
Wing area	233.4 sq ft.		

Move the Bench Not the Job

Pat'd and Pats Pending

"Hallowell" Semi-Portable Work-Bench of Steel

A Semi-Portable Work Bench on two casters—one you can trundle around from place to place, from job to job—how does that strike you?

Before the "HALLOWELL" Semi-Portable of Steel a work bench was a fixture—once in position there it remained.

Not so with the "HALLOWELL"—grab the handles and trundle Bench and all to where you want it let go, and the "HALLOWELL" lands on its two plain feet and becomes, at once, rigid as a rock.

And when the job is finished, roll the "HALLOWELL" away and leave it where least in the road, so floor and wall spaces can be used to best advantage.

Otherwise the construction is just like the now famous line of

"Hallowell" Steel Benching

Bulletins 386, 414, and 416—Yours for the Asking

STANDARD PRESSED STEEL CO.

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NEW YORK
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GOING IN for FLYING?

Here are six practical tests for selecting proper instruction:

1. Is the school *just a school*—or a unit in a well-rounded aeronautical set-up qualified to supply soundly trained pilots?
2. How complete and up-to-date is the equipment I will use?
3. How competent and well qualified are the instructors?
4. Has the school been examined and approved by the U S department of Commerce?
5. Is the climate at the school such as to permit year round flying?
6. Which school's diploma will be my best endorsement when I seek a connection after graduation?

Ask yourself these six questions!

ONCE you've decided on an aeronautical career, your next big problem is: *"How shall I prepare myself, where can I obtain the important training that will best equip me for later development?"*

* * * * * * * *

Back of the Boeing School of Aeronautics (Dept of Commerce approved school) are the 8,000,000 miles flown by Boeing system planes—the men who *built* these planes—and the men who *fly* them. And behind the *Boeing Company* are the international resources and equipment of the United Aircraft and Transport Corporation.

Experience—not just theory—forms the background for every Boeing-taught course. And Boeing instructors are seasoned pilots—men like George Myers, veteran of the air mail since 1923, with 5000 hours night and day flying to his credit. Four Boeing flying instructors have had a total of 22,000 hours flying experience, military, air mail and commercial.

Advanced training makes a competent pilot. Don't just "pick up" flying. Choose your school with an eye to your future. Check both ground school and flying courses. By these tests Boeing training is a sound investment. And Oakland's mild winter climate assures you ideal flying weather at times when students of less fortunately located schools must remain indoors!

New classes form quarterly. Mail coupon below or write us in detail about your plans for an aeronautical career.

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Division of United Aircraft and Transport Corporation

Airport · Oakland · California

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- ☐ Transport Pilot — *140 hrs. ground school. 50 hrs. dual, 150 hrs. solo*
- ☐ Limited Commercial — *70 hrs. ground school. 25 hrs. dual, 25 hrs. solo.*
- ☐ Master Mechanic — *Training for operations and manufacturing. 22 subjects. 2000 hrs. lecture-shop.*
- ☐ Master Pilot Ground School — *Includes subjects given only in universities. 864 hrs. (lecture-shop). 22 subjects*
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In every sort of weather, in every land, in thousands of miles of hard flying service, Zapon tested products consistently prove their worth. In aviation there is no compromise for safety—endurance—dependability.

Zapon's intensive system of testing and inspection of both chemical and physical properties insure the highest quality standard in:

Clear Nitrate Aeroplane Dopes
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The artistic beauty of Zapon Cloth, achieved through striking patterns and brilliant colors, has placed it first among fine cabin upholstering material. A standard for 30 years this waterproof material works evenly and smoothly.

THE ZAPON COMPANY
STAMFORD, CONN.

THIS AIR-MAIL-TESTED PLANE WORKS 7 DAYS A WEEK . . . .

—for mail and passenger lines.

—for business concerns alert to the importance of faster transportation.

THE POPULAR BOEING 40-B-4 FOR AIR MAIL AND COMMERCIAL USE

IT'S a stout-hearted rugged plane—this 40-B-4. As one of the famous series of "Boeing 40s", which carry half the nation's air mail, it has thoroughly proved itself under every conceivable flying condition. Easy to fly! Economical to operate! Faithful in performance! Will land in fields prohibitive to most airplanes of this payload capacity and is powered to take you out safely.

Small wonder that alert corporations, who seek more than the novelty of "owning an airplane", are turning to this thoroughly practical ship. In it they find the same high standards of efficiency characteristic of other Boeing models: a plane that is *on the job 7 days a week*—storm or sunshine—January or June!

Modern business is moving faster these days. Have *you* investigated the practical economies of swifter transportation? An inquiry will bring you data on 40-B-4 performance on mail-passenger lines and by representative corporations. * * * *40-B-4s are offered for immediate delivery!*

BOEING AIRPLANE COMPANY

Division of United Aircraft & Transport Corporation

SEATTLE, WASHINGTON

(In Canada: Boeing Aircraft of Canada, Ltd., Vancouver, B. C.)

PERFORMANCE

(Boeing Model 40-B-4 with full load)

Speed: High speed 138 m. p. h., cruising speed 115 m. p. h. Ample reserve power. Cruises 4½ hrs. without refueling.

Quick Take-off, Slow Landing: Takes off in 12 seconds after 558 ft. run. Lands at 57 m. p. h.

Power Plant: 1 Pratt & Whitney 525 H. P. "Hornet" engine.

Actual Pay Load: 4 passengers, mail and baggage (1163 lbs.)

Night Flying Equipment: Instrument board lights. Parachute flares and retractable landing lights.

Radio Equipped: Bonded, shielded and wired throughout.

Fabric Covering: Permits speedy, economical, accurate inspection—a safety factor.

Completely Equipped: No extras to buy or weight to add.

Special Features: Noise-proofed and insulated cabin. Oil cooler with shutter control operated from cockpit. Wheel brakes hand operated. Adjustable pilot's seat and rudder bar pedals. Electric inertia starter.

THE STAR PATHFINDER COMPASS

At the Bottom of the World with the Byrd Antarctic Expedition

PICKED by Commander Byrd the Star Pathfinder Compass accompanies him on his newest achievement—the conquest of the South Pole

AT THE BOTTOM OF THE WORLD in his thrilling flight to the South Pole—Commander Byrd, the greatest of all pathfinders, preferred the dependability and accuracy of another famous Pathfinder the STAR PATHFINDER MAGNETIC COMPASS

Write for complete information about various types

SPECIFICATIONS:

Vertical dial, tubular rear base, built in compensating unit, flush type mounting with removable cover plate. Indirect lighting 4½ in. high 3½ in. deep 6½ in. wide. Compact—rugged—vibration proof

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THE *Searchlight* Section of this paper represents a meeting place for men and concerns who have immediate business "wants" to fill—the section covers

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Books and Periodicals	Partners Wanted
Business Opportunities	Patent Attorneys
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BURGESS DRY CELL BATTERIES

Have Stood the Test under all kinds of conditions for Aircraft, Radio, Ignition, Flashlight and low voltage lighting

BURGESS BATTERY COMPANY
General Sales Office, Chicago

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- PERMANENT -
- FIRE-PROOF -
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For Air Mail use . . . . SUPER MAILWING
For Sport or Private use . . SPORT MAILWING

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Cunningham-Hall Airplanes

All-metal structure — insures durability, lower maintenance and greater safety

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23

Makes of Planes Now Standard Equipped With

AEROL LANDING STRUTS

Every fourth issue of Aviation (as well as every issue of three leading monthlies) carries full page advertisements featuring individual planes in this group. Watch these advertisements.

THE CLEVELAND PNEUMATIC TOOL CO.
Cleveland, Ohio

AIRPLANE SKIS

Frozen Lakes, Ponds, and Rivers allow you to fly where planes never operated before.

Carefully designed, well made and tested in four years actual use.

Write for Circular.

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EVERY airport owner or manager should have a copy of our new booklet, *Tycos Meteorological Instruments for Airports.* Illustrated throughout and listing instruments which meet government requirements. Write for your copy today.

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Makers of Wheels for airplanes

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W. W. Moss, President, with aviation manufacturing and financial background, lends experienced leadership to the fine group of B/J engineers. **G. Roger Coats**, Salesmanager, with broad automotive and other merchandising experience, is in a key position to effectively plan and promote sales development for B/J distributors and dealers. *Expect great things of B/J planes*

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AIRCRAFT CORPORATION
BALTIMORE MARYLAND

U S SPECIAL AVIATION PISTON RINGS

Used by:

Aeromarine	Curtiss
Alliance	Fairchild
Allison	Pratt & Whitney
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Comet	and many others

See full page advertisement in current issues of Auto Digest, Western Flying and Aviation Engineering

U S Hammered Piston Ring Co., Paterson N. J.

WINTER BARGAINS

DH TIRES—Regular value, good tires that have a lot of wear a saving to you in this sale at each $4.00

$\frac{1}{4}$" and $\frac{3}{16}$" SHACKLES—Former government specifications same material but slightly different in dimensions, each...... 10c

26x4 TIRES—Climber, smooth tread, regular $9.00 value, in this special sale at each **$5.30**

ZENITH ALTIMETERS—Registers 0 to 20,000, accurate and dependable $3\frac{1}{2}$ inch dial, sturdily built, aluminum case Japanned black, new in original boxes, each $8.40

SPECIAL NB ALTIMETERS—Registers 0 to 25,000 feet, an unusually accurate instrument $3\frac{1}{2}$ inch dial, new in original boxes, in this sale, each $4.90

OX5 PARTS SPECIAL

Plan to overhaul that OX5 Motor this winter. To make this more economical for you we have made special prices on several items. Determine your requirements. Send for this special list. Let us quote you prices.

BURD PISTON RINGS—Both standard and oversize for OX5 motor. Everyone knows this particular ring, we have an overstock and price them in this special sale at each .... .07c.

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Travel Air Plane equipped with Pollak N.A.C.A. Cowling. Speed increased 13 miles an hour

Speed Up Your Planes with N.A.C.A. Cowling

Cowling is but one of the many dependable aluminum parts and accessories we manufacture for the aviation industry. Some of these are Tanks, Manifolds, Fuel Line Fittings, Seats, C1 and C2 Strainers, Wash Basins, Lavatory Sets, Nose Cowlings, Engine Mounts, Electrical Equipment Panels, Switches, Landing Lights, Running Lights, Compass Lights, etc. etc.

Ask us for quotations on your requirements

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Strategically located links in the TAC Service Chain

Efficient TAC overhaul facilities are easily accessible to transient flyers in Ohio and Michigan. Hangars in Cleveland, Pontiac and Kalamazoo are on traveled airways within easy flying distance of points in these and neighboring states. Modern service, veteran mechanics, tested equipment. Rebuilt motors run in and block tested. Service on all motors, official Wright service. Replacements, gas and tires. Pioneer instruments.

Thompson Aeronautical Corp.
CLEVELAND, OHIO

Ohio and Michigan Distributors for Stinson, Gypsy Moth, Savoia-Marchetti Amphibian, Parks and Pitcairn Sport Mailwing, Bendix Products, Kasco Aero Products and Berryloid Finishes

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Think "SEARCHLIGHT" First!

UNIVERSAL

ALL AERONAUTICAL SUPPLIES

AVIATION CORPORATION
ROBERTSON DIVISION
LAMBERT-ST. LOUIS AIRPORT, ANGLUM, MISSOURI

WHERE TO FLY

The fact that schools advertising in the WHERE TO FLY section of AVIATION have done so over a period of years is one of the best testimonials to the efficiency of this type of advertising.

AIRCRAFT SERVICE DIRECTORY

GOOD ADVICE

Should Be Solicited When Needed

Every Airplane Plant presents a set of highly individual problems that must be answered by expert assistance, taking into consideration all of the technical peculiarities of the plant under scrutiny.

You can find the specific answer to your aviation problem through the Directory of Professional Service

on Page 61

Professional Services

This Service Directory

is designed to give you the kind of services that will be of real value to your business

Take advantage of it

SEARCHLIGHT SECTION

FOR SALE

ALPHABETICAL INDEX TO ADVERTISEMENTS

ALPHABETICAL INDEX TO ADVERTISEMENTS

First the North Pole
Then the South!

LACONICALLY, out of the snow and cold, this story of Wright engines—one "Cyclone" and two "Whirlwinds"—is told by Commander Byrd, who now has flown both Poles behind Wright power.

The plane "Floyd Bennett" took the air at 3:30 P. M. November 28th. "*Motors fine.*" At 5:30 they were flying well and nearing the great crevasses. "*Motors fine.*"

At 7:00 they were nearing Gould's geological party struggling along the trail beneath. "*Motors fine.*" By midnight they had covered seven hundred miles and the Pole lay ninety miles beyond. "*Motors fine.*"

At 1:00 Byrd's calculations indicated they had reached the Pole and were flying high for observation. Plane and crew in good shape. "*Motors fine.*" They crossed the Pole . . . flew beyond it . . . around it . . . and then turned North. "*Motors fine.*"

At 4:33 they landed at the Mountain Supply Depot, re-fueled and were on their way again at 6:00. "*Motors fine.*" At 8:00 they crossed again the great crevasses, flying well. "*Motors fine.*" At 10:10 Balchen landed at Little America after flying 1600 miles in 17 hours and June signed off. "*Motors fine.*"

WRIGHT

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